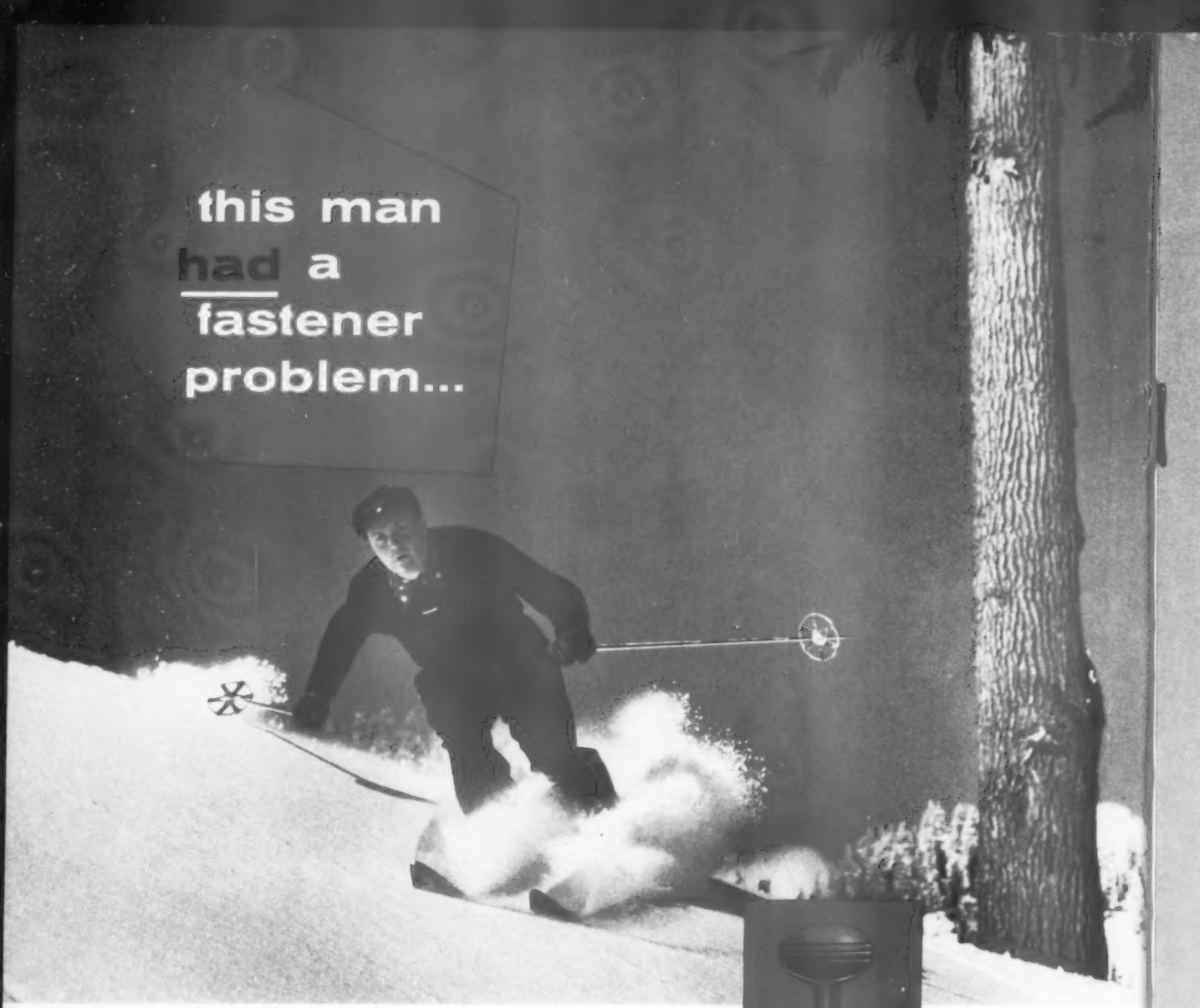
A HITCHCOCK PUBLICATION

DECEMBER • 1959

assembly & fastener ENGINEERING



and here's how Pheoll solved it

He's skimming the surface now—yet a short time ago this design engineer was "knee-deep" in a 2-way fastener problem: First, how to hold a board absolutely rigid against the flange guide of a table saw; and second, how to produce the fastener on a simplified and economical basis. Originally, his company tried using an ordinary "C" clamp, but later switched to a hand-assembled 3-piece post clamp. This too proved costly and inadequate.

Pheoll came into the picture and immediately reduced material costs and eliminated a bending operation; replacing a four slide part with a cold headed thumb screw. Then Pheoll dog-pointed and end-drilled the bottom of the thumb screw which allowed the attachment of a permanent spinning grip washer. Previously, this piece consisted of three parts manufactured by three separate industries.

Pheoll automatically produced and assembled the one-piece unit, shipping it to the table saw manufacturer at lower costs—with none of the previous manufacturing, assembly or inventory problems. *This is Pheoll in action*—a versatile, cost-conscious, quality-minded team ready to serve you...the next time you have a fastener problem.

HEADING THE FASTENER INDUSTRY FOR OVER 50 YEARS

Pheoll Manufacturing Company, Inc.

5700 WEST ROOSEVELT ROAD CHICAGO 50, ILLINOIS

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assembly & fastener ENGINEERING

December, 1959 Volume 2, Number 3

FEATURES

Still No Substitute for His Star 9
A Christmas message reflecting on the need for using our scientific advancements for the betterment of mankind

What's Ahead for Public Transit? 11
The realization is growing that public transportation which built our cities and our prosperity must be returned to.

Standardization at Quicfrez 28
In competition with the giants in the appliance industry, Quicfrez relies on proven methods and standardizes on every item possible.

Preparing Holes for High Strength Fastenings 34
Hole coining, broaching and expansion are new techniques used by Douglas Aircraft on their DC-8 jetliner

Soldering and Brazing Valve Parts 40
A switch to automatic equipment helps Flair solve several problems in the production of air-venting valves and related accessories.

Force Gaging of Assemblies 43
How the use of portable gages can speed production testing of assembled parts.

Selective Assembly for Pistons 47
Fixtures expedite assembly and color-coding facilitates the selection of components at the Oldsmobile plant.

Wooden Mockups Speed Computer Assembly 50
Pre-production use of mockups cuts lead time for equipment produced at the computer facilities of Librascope.

DEPARTMENTS

2 Letters to the Editor
12 Business Notes
19 Assembly & Fastening Ideas
25 Reports from the Field
53 What's New in Equipment
61 What's New in Fasteners
69 Useful Literature
73 Industry Makes News
79 Product Index
82 One Last Word

• Man is getting close to projecting himself into space in a vehicle similar to the one shown on the cover. But for all his scientific advancement, he should not be forgetful of his fellow men, as pointed out in our Christmas message on page 9.

Subscription rates: $6.00 per year in U.S.A. $7.50 per year elsewhere.

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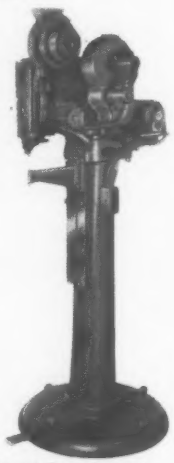
25 . . . now 8

AUTOMATED FASTENING OPERATION CUTS LABOR COSTS

OVER 60 PER CENT AT INDIANA PLANT

In a well operated Indiana plant allied to the furniture business, you will see a group of eight employees who today have replaced 25 formerly required on the assembling and fastening line. The output is the same while labor cost is over 60 per cent less. This big saving has been accomplished by replacing manual with automatic operation—National Rivets and automated Riveting Machines tooled for the specific job requirements. The result—lowest cost-in-place fastenings.



Pedestal Type Automatic Riveting Machine—each tooled to meet users specific automated job.

MORE PRODUCTION WITH FEWER EMPLOYEES

In spite of the wide use of rivets for assembly purposes, there are still many who have overlooked this means of getting more assembly work accomplished with fewer employees. Have you? Send sample assembly if possible, or a blue print for practical recommendations. You will find that National Automatic Riveting can cut your payroll costs, too.

Write today!

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NATIONAL RIVETS
TUBULAR, SPLIT, SOLID ALL METALS

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Letters to the Editor

Torquing and Wrenching

I have read two of your fine articles, "Determining Torque-Tension Relationships" in the March 1959 issue, and "When to Use Snap-Torque Wrenches" in the October 1959 issue.

They have been a great help, and I would appreciate your sending me a copy of the article, "How Tight Is Tight?" from your December 1958 issue.

A. T. Southart
Test and Development Dept.
Body Product Engineering
Ford Motor Company
Dearbon, Michigan

Regarding the article on "When to Use Snap-Torque Wrenches", we would appreciate receiving all information available on this subject.

Bruce Wiley
Production Engineer
Varo Manufacturing Co.
Garland, Texas

Will you please advise the names of the manufacturers of snap-torque wrenches?

Leo Zimmerer
Purchasing Agent
Kingtson Products Corp.
Kokomo, Indiana

Fastener Problem Solving

Will you please place my name on the mailing list for your excellent magazine? I recently came in contact with it through a close friend from another company.

Your September issue quickly gave us leads which in turn led to the solution of a problem we had at the time. Since then this same issue has served as a guide in similar problems.

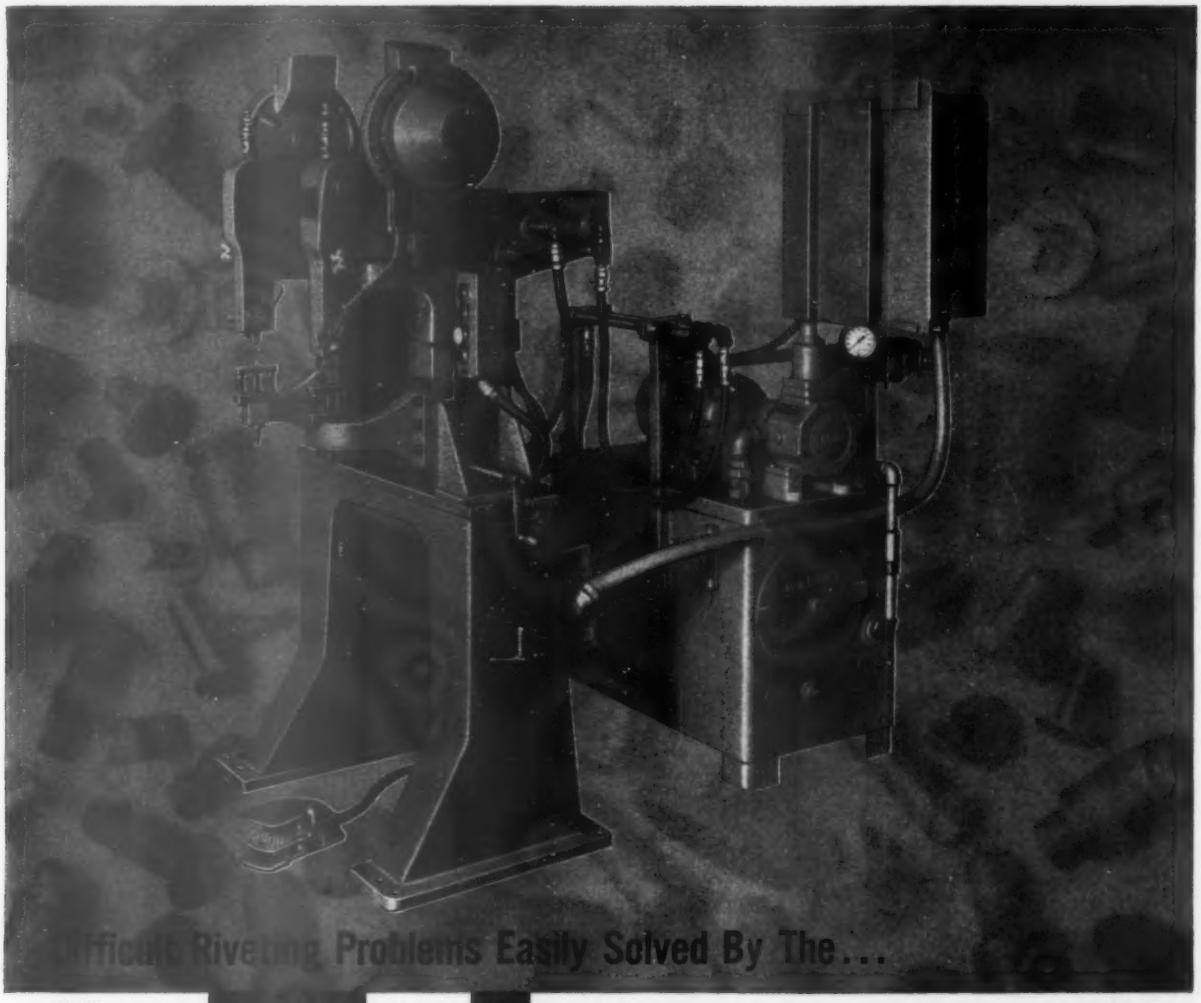
If this request for a free subscription is granted, the magazine will be placed in the main drafting room where it will be available to all personnel of our design and drafting department.

M. W. Hall
Chief Draftsman
Atlantic Research Corporation
Alexandria, Virginia

Quality Control

Please send me ten copies of the editorial in your August issue, "Don't Compromise with Quality Control".

P. Cassanos
Process Control Engineer
Communication Products Dept.
General Electric Company
Lynchburg, Virginia



New T-J HYDRAULIC DUAL RIVITOR

With Increased Riveting Production • Quality • Versatility

Added recently to the versatile T-J line of unit and production line riveting and clinching machines is the new Hydraulic Dual Rivitor. The Model HDR will set two ¼" solid steel rivets at once with adjustable spacing from 1-½" to 18" maximum, center to center, being fed from 10" hoppers. Operating cycle is approximately .8 second, at 420 P.S.I. oil pressure furnished from a hydraulic power unit with maximum of 1000 P.S.I. output. For complete specifications write to The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Michigan for Bulletin HDR-4-59.

For information on other T-J Rivitors and Clinchors write for Bulletin No. 555.

T-J TOMKINS-JOHNSON
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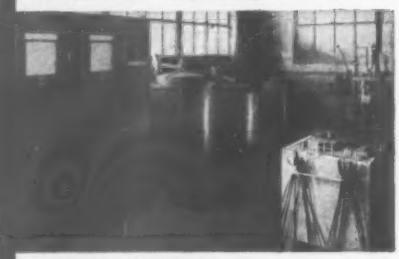
COLD HEADING

PLATING

SLOTTING

DRILLING—TAPPING

THREAD ROLLING

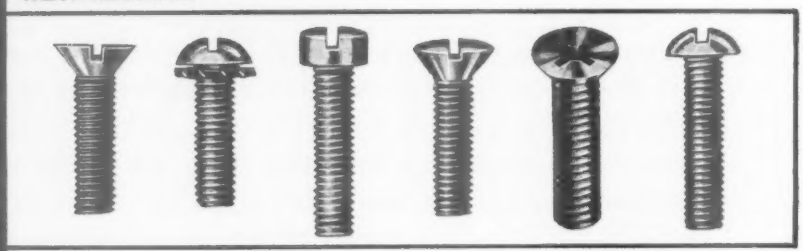


HEAT-TREATING

TURNING—POINTING

The facilities and services behind a product often help to confirm claims of quality. Here at Hubbell we have the equipment to produce the finest metal fasteners: machine screws, rivets, studs, etc. We will gladly put this equipment to work for you.

Standards, Specials, Miniatures . . . whatever you need, we will gladly estimate.



In conjunction with our modern production methods, Hubbell's engineering facilities are available to you for any design or fabrication problem.

Harvey Hubbell, Incorporated

Machine Screw Department • Bridgeport 2, Conn.

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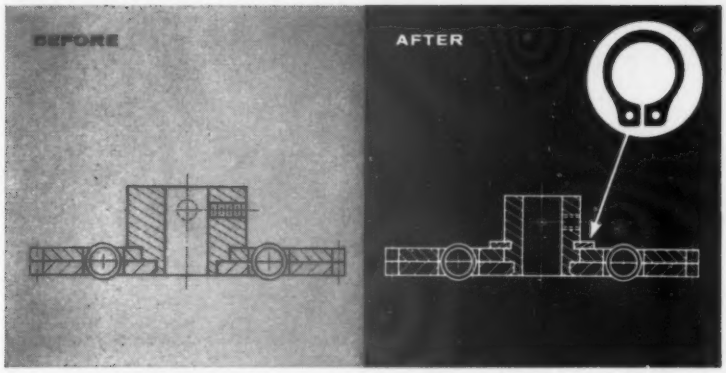
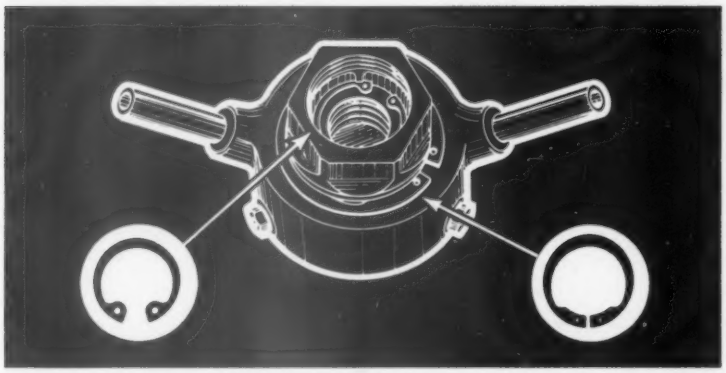
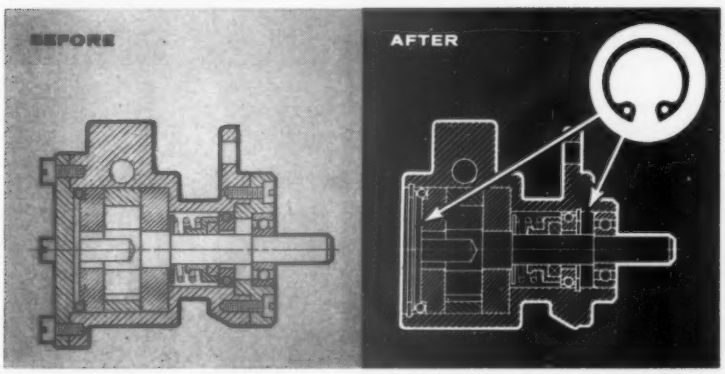


Gear assembly improved. A Waldes Truarc Series 5100 retaining ring in this anti-backlash gear assembly eliminates machining and staking operations, reduces hub size, and allows easy disassembly, after gears are cut as a unit, for faster, better deburring. **Typical savings: $350.00 per 1000 units.**



Threaded retainers eliminated. In this self-sealing coupling, costly internal and external threaded retainers were eliminated by easy-to-apply internal (Series 5000) and external (Series 5108) Truarc retaining rings. **Savings per unit amounted to $4.02.**



End-cover design simplified. In this general-purpose pump, two Waldes Truarc, Series 5000, internal retaining rings make possible the elimination of two cover-plate castings (plus machining) and eight screws (plus drilling and tapping). Weight and dimensions are reduced and assembly and disassembly are greatly facilitated. **Typical cost savings: $1.48 per unit.**

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WALDES
TRUARC®
RETAINING RINGS
Waldes Kohinoor Inc., Long Island City 1, N. Y.

Designing for axial assembly with Truarc retaining rings

eliminates parts, machining, speeds assembly, simplifies maintenance

The proper application of retaining rings on or in axial assemblies can often effect startling simplifications and economies in design when compared to corresponding designs with conventional fastening devices. A few typical examples, using basic types of retaining rings, are shown in the accompanying drawings.

Threading, tapping, drilling, facing and other costly, time-consuming operations can be eliminated. Retaining rings are already in wide use in a tremendous variety of equipment ranging from household products to high-precision military gear designed for use under the most severe environmental conditions. They are quickly and simply installed in easily cut grooves which can often be machined simultaneously with other operations. The rings can frequently replace bulkier, more costly fastening devices —such as nuts, screws, studs, threaded sleeves and retainers, cotter pins, set collars, rivets and machined shoulders.

What's more, rings frequently make practical designs which could be achieved with no other known fastening device.

Although the ring types shown here are basic, Truarc retaining rings come in 50 functionally different types, as many as 97 different sizes within a type, 6 metal specifications and 13 finishes. You'll find detailed descriptions of Truarc retaining rings and assembly tools, plus more than 70 typical applications in the new 24-page catalogue RR10-58. Write for your copy today.

And remember, Waldes engineers are always ready to help you solve your application problems—whether it involves one of the standard Truarc rings or a "special" to fit your particular requirements. Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y. D-1

TRUARC RETAINING RINGS...THE ENGINEERED FASTENING METHOD FOR REDUCING MATERIAL, MACHINING AND ASSEMBLY COSTS

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why make parts the slow, costly way?

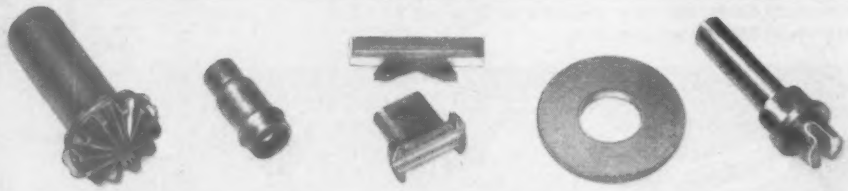
COLD-HEAD THEM!

Steel

Tappet plunger, splined square-head shaft, collar for adjustment wedge, universal joint bearing cup, pipe plug, spark plug body.

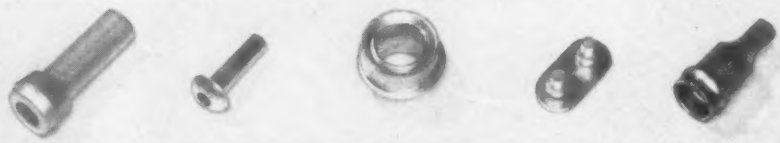
Copper

Ornamental stud, distributor cap center insert, commutator bar, wire clamp, solenoid contact, starter field terminal.



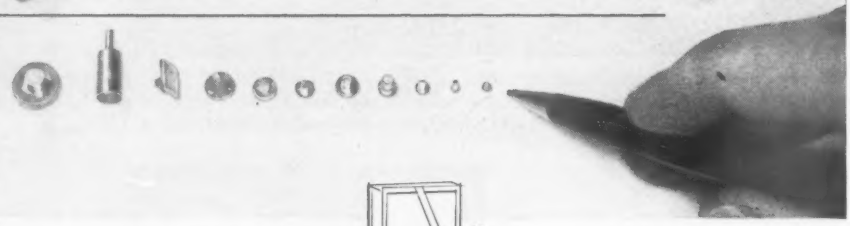
Aluminum

Hollow rivet, blind rivet, flanged collar, link, distributor cap outside insert.



Precious Metals

Electrical contact, transistor case, miscellaneous rivets and electrical contacts.



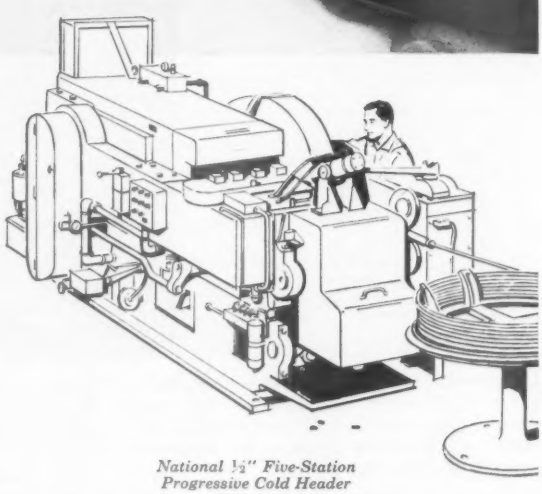
Of various metals, the parts identified above were developed for fast, accurate production on National Cold Headers.

Most of these important jobs are made without waste, ready for end use. All are cold-forged from coiled wire – start-to-finish in one compact Header – without any intermediate steps.

New technical break-throughs are making jobs like the above every day commercial realities. More workable wire, better lubricants, improved die materials and vast engineering experience are combining to adapt formerly difficult work to modern, profitable methods.

Whether you now have Headers or not, send us prints or samples of your jobs, or bring them to Tiffin where more of our people can help with *your* problem.

Perhaps up-to-date Cold Heading, a truly fast-growing process in metalworking, can pay off for you.



National ½" Five-Station Progressive Cold Header

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Self-retaining "U" and "J" SPEED NUTS® cut assembly costs up to 50% or more!

If you are worried about rising assembly costs, let one-piece "U" and "J" SPEED NUTS keep costs down . . . and improve your product.

They can't fall off, once they've been pressed into screw-receiving position. No welding, staking or other secondary fastening devices needed. You eliminate lock washers – spring steel SPEED NUTS are self-locking, make vibration-proof attachments.

SPEED NUTS are ideal for blind assembly or hard-to-reach locations. Apply them *before* you paint panels without danger of paint-clogging. Or *after* porcelainizing, without damage to finishes. The "U" type is similar to the "J" type, shown above, but is used where full bearing surface on the lower leg is required.

A free Fastening Analysis can tell where SPEED NUT brand fasteners belong on your products. Call your Tinnerman representative –he's listed in most major telephone directories. Or write to:

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E. H. WERNER, *Production Control Manager, Lamson & Sessions, tells why...*

It's costly to be close-mouthed in ordering fasteners

THE more "specifics" you give us about your fastener needs, the more headaches and money we can save you. For example:

What quantity is required . . . and when? To give you economical production runs, using the most efficient tooling methods, we need specific information. Give us *realistic* quantities — how many must be shipped by a given time—what you expect future usage to be—delivery intervals required. This gives you maximum economy.

What are the physical requirements? Give us the "physicals" and let us recommend the suitable material. When prints specify a steel not commonly used, it must often be procured at a premium, which adds to your cost.

What are the critical dimensions? Close tolerances invariably add to cost. If you indicate which non-critical dimensions might be modified—radii, angles, fillets, lengths, outside and inside diameters, concentricity, etc.—we can often eliminate expensive secondary operations.

What quality level is required? This determines whether 100% inspection is necessary, sample inspection is adequate, or only certain dimensions must be inspected.

Take advantage of the specialized experience and facilities available to you through L & S, to save money and headaches on fastener buying.

L & S Fastener Engineering helps you "tighten up" on...

- **PURCHASING COSTS**
- **INSPECTION AND HANDLING COSTS**
- **ASSEMBLY COSTS**

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Plants in Cleveland and Kent, Ohio • Chicago and Birmingham

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Still no substitute for His star

Every calendar and every dateline proclaim that 1959 years ago Christ was born. The message that night was, "Peace on earth and good will toward men."

For almost two thousand years men have sought to develop a formula for peace. But greed for power and total conquest have defeated their efforts. The wreckage of the last quarter century shows that great advances in sciences have only increased the havoc.

In 1959 we see nations seeking to gain superiority through atomic weapons, missiles and scientific achievement. Claims are being made for outer space. But He whose star shone that eventful night is still the ruler of the universe.

We believe that Jesus Christ came to this earth bringing and proclaiming—not a new religion or a revised religion—but a way of life. A way of life that brings peace and joy and happiness to each one who follows it. For the peace proclaimed by the angels is peace for the individual. It was not a promise to all mankind that wars would cease. The promised peace is only for those who accept this Babe of Bethlehem as the Son of God, and follow His way of life.

And His way is a life of service. It begins with understanding this command: "Thou shalt love the Lord thy God with all thy heart, and with all thy soul, and with all thy mind . . . and thy neighbor as thyself." (Matthew 22:37)

The answer to the great problem of today is not in war or demonstrations of power, but in using our scientific advancements for the betterment of mankind. Ours is the responsibility in everyday living to carry on for a better world by keeping Christ's principles.

The history of the world has been one of hate, greed, jealousy, envy and a desire to be first. Unless we are willing to have the spirit of Christ in our hearts, there is small likelihood that the future will be very different.

At the birth of Christ, light was given which no darkness can extinguish, nor scientific accomplishments dim. Let us walk in that light. It will then be a truly Merry Christmas and a blessed and prosperous 1960.

Robert C. VanZoeren

President
Hitchcock Publishing Company

FAST, HAMMER-DRIVEN RIVET ECONOMICAL FOR BLIND AND OPEN APPLICATIONS

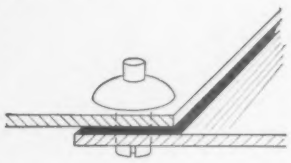

Fig. 1 Inserted in hole, Southco Rivets are quickly set by driving pin with hammer. No special tools are required. Bucking is not necessary.

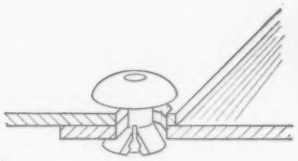

Fig. 2 Expanded prongs force sheets or parts together, hold them tightly in compression. No metal is removed, no grinding or finishing is required.

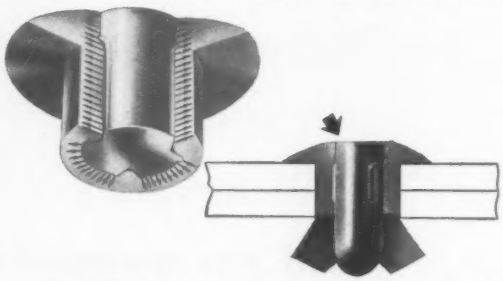

Fig. 3 Pin is locked securely into rivet by displaced metal filling unique grooves. Compression forces are utilized for greater strength.

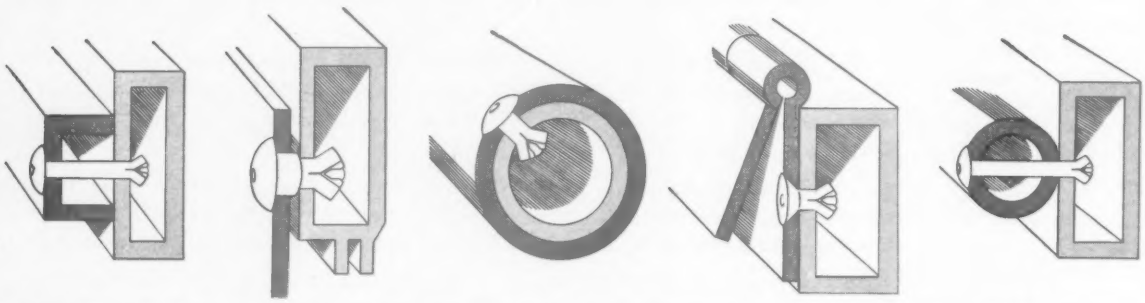

Fig. 4 Ideally suited for "blind" applications, Southco Rivets are worked by one man from one side only and require minimum space inside closed area. They eliminate costly bucking arrangement or time-consuming finishing. Supplied as a unit, they require no job time for assembly or fitting.

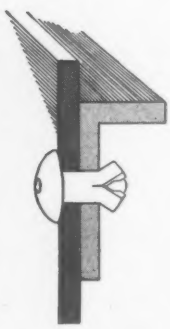

Fig. 5 Access or open fastening utilizes the simplicity, speed and vibration-resistance of Southco Rivets.

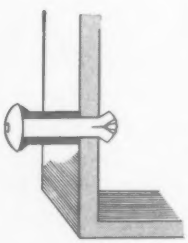

Fig. 6 Ferrules are used as spacers for numerous applications. Here the Southco Rivet forms a drawer pull in conjunction with a flanged tube.

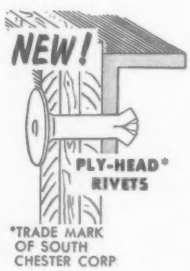

Fig. 7 Increased head size distributes holding pressure over larger area, permits higher loading on wood, plastics and similar materials.

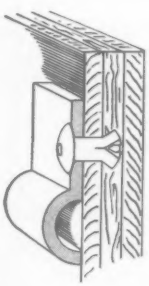

Fig. 8 A blind head can be formed inside the wood. This application is particularly useful when it is desirable to have one surface of the wood unmarred.

FREE

RIVET FOLDER

Send for your free copy of "Southco Drive Rivets" Folder. Gives complete information on the application, installation, and specifications of aluminum and steel Drive Rivets.

Write on your letterhead to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pennsylvania.

SOUTHCO FASTENERS

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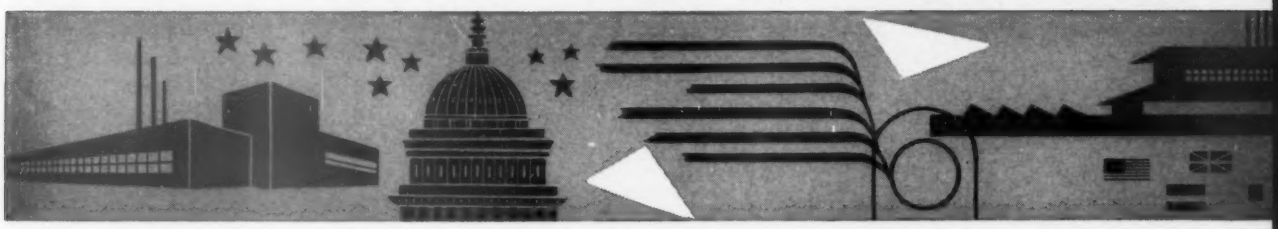
The State of Business



WHAT'S AHEAD FOR CITY TRANSIT?

by **Harley L. Swift**

"Yes, this is Acme. No, sir, you may not drive your car further into the city. Only emergency vehicles and those designated as essential to the public well-being can use the interior streets. Oh, yes sir, there are very fine hotels downtown. Well, you just drive your car over here, one street to the left, and into the Central City Hotels Association Building. After you register, your car will be parked and you and your luggage will be transported without charge in the air-conditioned Association coach to your hotel. Yes, ma'am, there are several very nice motor hotels out this way.

"Use public transportation? Sure, everybody in

HARLEY L. SWIFT

Transportation Consultant
Harrisburg, Pa.

Registered engineer Swift is public transportation's most colorful, dynamic national spokesman. The retired president of the model Harrisburg system has 44 years of transit experience.

Acme does. Oh no, everybody has a seat, and it is much quicker than it was in the old days when everybody used his car. Expensive? No, we've found it cheaper than driving. Acme has the lowest public transportation fares of any city."

No, I don't know of any Acme, U.S.A., and I may never see such a place. But you might. The trend is in this direction.

Name your city—Los Angeles, New York, Rochester, Toledo. Their problem is not the automobile and the truck. Their problem is the movement of people and material in a minimum of time! Los Angeles has attempted to solve it through freeways; New York, through public transportation. Neither city has been entirely successful, but Manhattan has not deteriorated business-wise as much as has downtown Los Angeles.

Traffic is giving great concern to every city. The realization is growing that public transportation which built our cities, and our prosperity, must be turned to, returned to.

Witness the San Francisco Bay Area rapid transit study, the recent New Jersey legislation authorizing the use of highway toll money to preserve and augment commuter service by railroads serving not only New Jersey but also New York City; the proposed Transportation Authorities for Pittsburgh, Baltimore and St. Louis.

Picture the man in his Cadillac, the sun-tanned brunette in her Thunderbird convertible, the young executive in his Opel, the mechanic or clerk in his four year old Chevy. Enroute to office or shop, once they turn on the throughway or main street, all have the same problem. They can not move any faster than the volume of vehicles on the road will permit. And when they get to their destination they must still cope with parking.

The person relying on public transportation faces some of the same problems. Instead of stepping into his car at the kitchen door, he wends his way to the bus or train and is tied to a fixed schedule. It may take him a few minutes longer than his motorist neighbor and he may have to stand part of the way.

Present day facilities—automobiles, buses, rapid transit, highways—will only aggravate these headaches. We can not build highways of sufficient capacity at a cost we can afford, either in dollars or land, to handle the volume of traffic that vehicle and population censuses predict.

Will our cities die of automotive strangulation? I think not. The public is being made as well aware of the threat of traffic cancer by forward-looking city officials as doctors have made us aware of the dangers of human cancer.

Instead of building divided throughways of six, eight, ten or more lanes solely for autos, two and

continued

Vibration can't loosen Loctite-treated fasteners

The HOMELITE six-horsepower chain saw weighs only 19 pounds. So much power per pound requires maximum resistance to vibration in the fasteners holding parts together.

LOCTITE, the liquid lock washer, locks all critical fasteners on this gasoline-driven chain saw . . . providing dependable service in rugged field use.

LOCTITE Sealant is a liquid which hardens between metal parts to form a bond with greater holding power than any mechanical locking device. The added holding power of LOCTITE-treated fasteners allows Homelite to use reduced tightening torques and thus avoid stripping threads in the aluminum castings.

While adding to product reliability, LOCTITE provides substantial cost savings. At Homelite, the 27 different size fasteners required in assembling the chain saws are treated with LOCTITE by tumbling in plastic bags. Treated screws store for days . . . lock only when assembled.

There's a Loctite application method suited to all production requirements. If your product faces shock and vibration in use, you can eliminate breakdowns due to loose threaded fasteners . . . cut service cost and customer complaints . . . by using Loctite. Write for literature and free sample.

LOCTITE® SEALANT
AMERICAN SEALANTS COMPANY
135 Woodbine St., Hartford 6, Conn.
In Canada: J. S. Parkes & Co., Ltd., Montreal

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four lane throughways restricted for public transportation vehicles will be built. They will feed into limited—access streets in the commercial area reserved for public transportation vehicles. Throughways explicitly for public transportation will fan out from the central city and, in some cases, may connect two or more cities.

Vehicles on transit throughways will run non-stop at high speeds. There will be no standing passengers, there will be air conditioning, picture windows, comfortable seats, ease of entrance and exit and frequent scheduling.

The goal will be a combination of speed, comfort and convenience superior to that of the auto.

The problems of transportation and highway construction and use will be centered in one department of the city or region and financed through public taxation, like sewers, water and streets are today.

As Cleveland has done, cities will revive abandoned railroad rights-of-way to establish rail rapid transit, using open track and subway construction, with bus feeder lines and parking lots at suburban stations. Or pave these rights of way for the exclusive use of public transportation vehicles. Such a proposal has been made for the use of the abandoned Maryland and Pennsylvania Railroad right-of-way between Towson and downtown Baltimore.

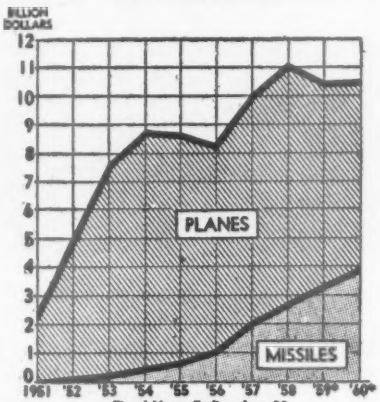
Because of the necessity for and the nature of rail supports, it is doubtful that monorail systems will gain popular favor despite the high speeds they offer.

Taxicabs will act as collectors in the suburbs and as both collectors and distributors in the congested areas.

Public transportation will give way only to fire apparatus and ambulances.

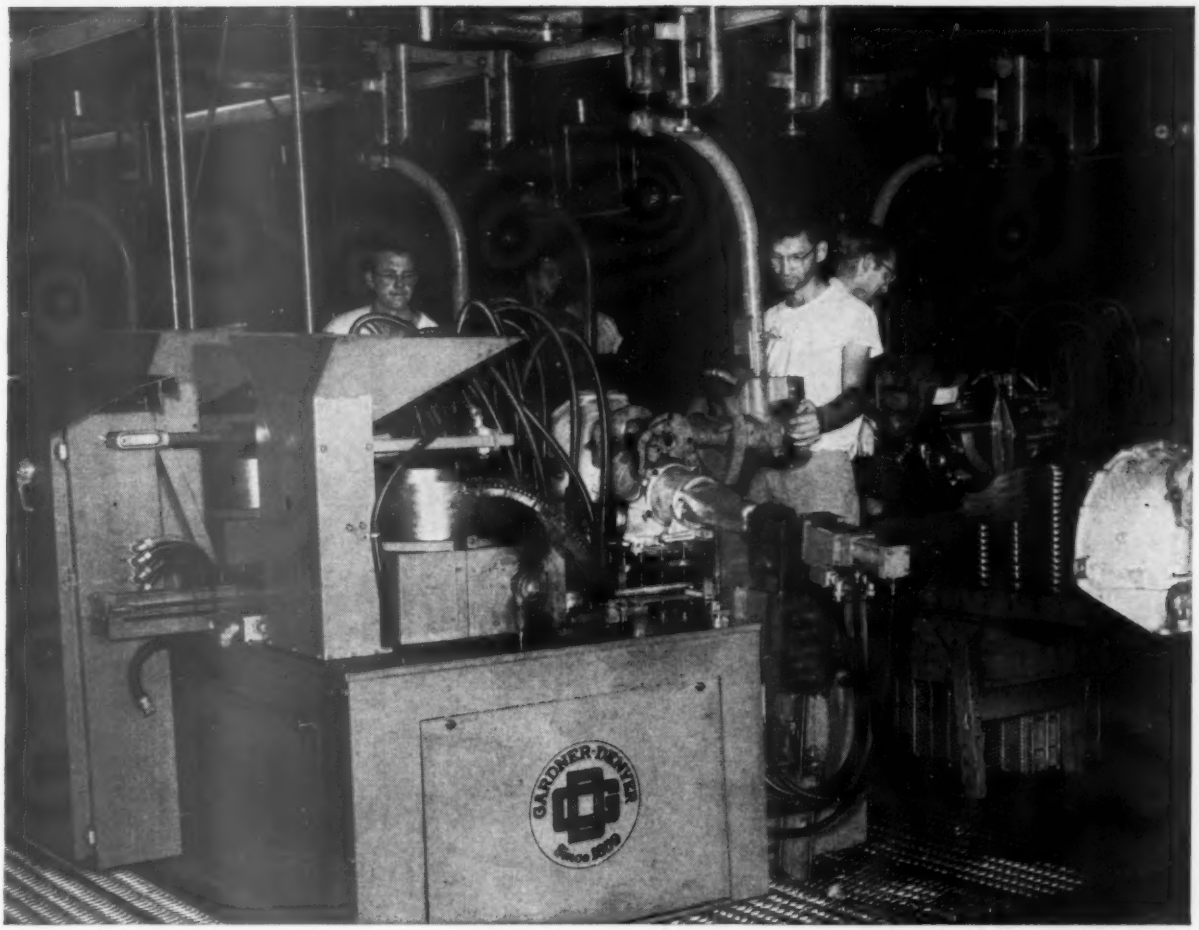
And a final prediction! With radar control and landing ports on office buildings, hotels, department stores and warehouse roofs, the helicopter and the small airplane will have a limited but active place in solving the traffic problems of our cities. •

AMOUNT SPENT FOR MISSILES AND PLANES

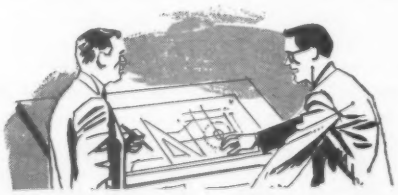


INDUSTRY BRIEFS

The Pentagon's McNeil predicts the defense budget will remain at about $41 billion for several years. Manpower cuts and reduced aircraft buying will balance increases in missiles . . . Since the T-H Law doesn't affect railways, there is nothing to stop a nationwide walkout. The delaying powers of the Railway Labor Act now in operation will run their course by February. And isn't Jan. 27 also the steel deadline? Congress may legislate; there is talk of stretching the "public utility" concept to key industries . . . Between 1952-58 the number of U.S. firms operating abroad went up 50%, to 2233 plants. Tops are Canada, 417, Britain, 176, Mexico, 143, Brazil, 102, Australia, 91, Venezuela, 90, Germany, 88 . . . GM sold 3,084,818 cars and trucks in the first nine months, up 32% over 1958 and 6% over 1957 . . . Due to airline complaints, look for MATS activity to be curtailed . . . The Government had $8.8 billion in surplus food stored on August 31, compared to $7.1 billion a year earlier . . . Prices on non-ferrous metals will be firm at 15-20% higher levels by year's end . . . Transistor sales were up two-million in first eight months, to 49 million . . . With an expected $3 billion tax surplus in fiscal-1961, Democrats will press for an increase in individual exemptions to $700, Republicans for a tax reduction of from 5% to 10%.



Ford speeds transmission production with special air-powered machines



IN INDUSTRY — SPEEDING THE PACE, the Gardner-Denver specialist is an integral part of the team. He works side by side with engineers and designers, helping to solve their problems. At Gardner-Denver there's no substitute for men—our 100-year philosophy of growth.

Three special pneumatic machines—designed by Gardner-Denver specifically for Ford Motor Company—step up production of automatic transmissions. These units automatically and simultaneously feed cap screws, hold and support the transmission, and set the screws on the oil pan assembly in a fraction of manual time.

This example is typical of the many tough problems that Gardner-Denver solves for production men. If you need a special multiple-spindle machine to speed assembly, Gardner-Denver specialists will work with your tool engineers to design and build one that exactly fits the job. Contact your Gardner-Denver representative for details.

GARDNER-DENVER Since 1859 — 100 1959 YEARS

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

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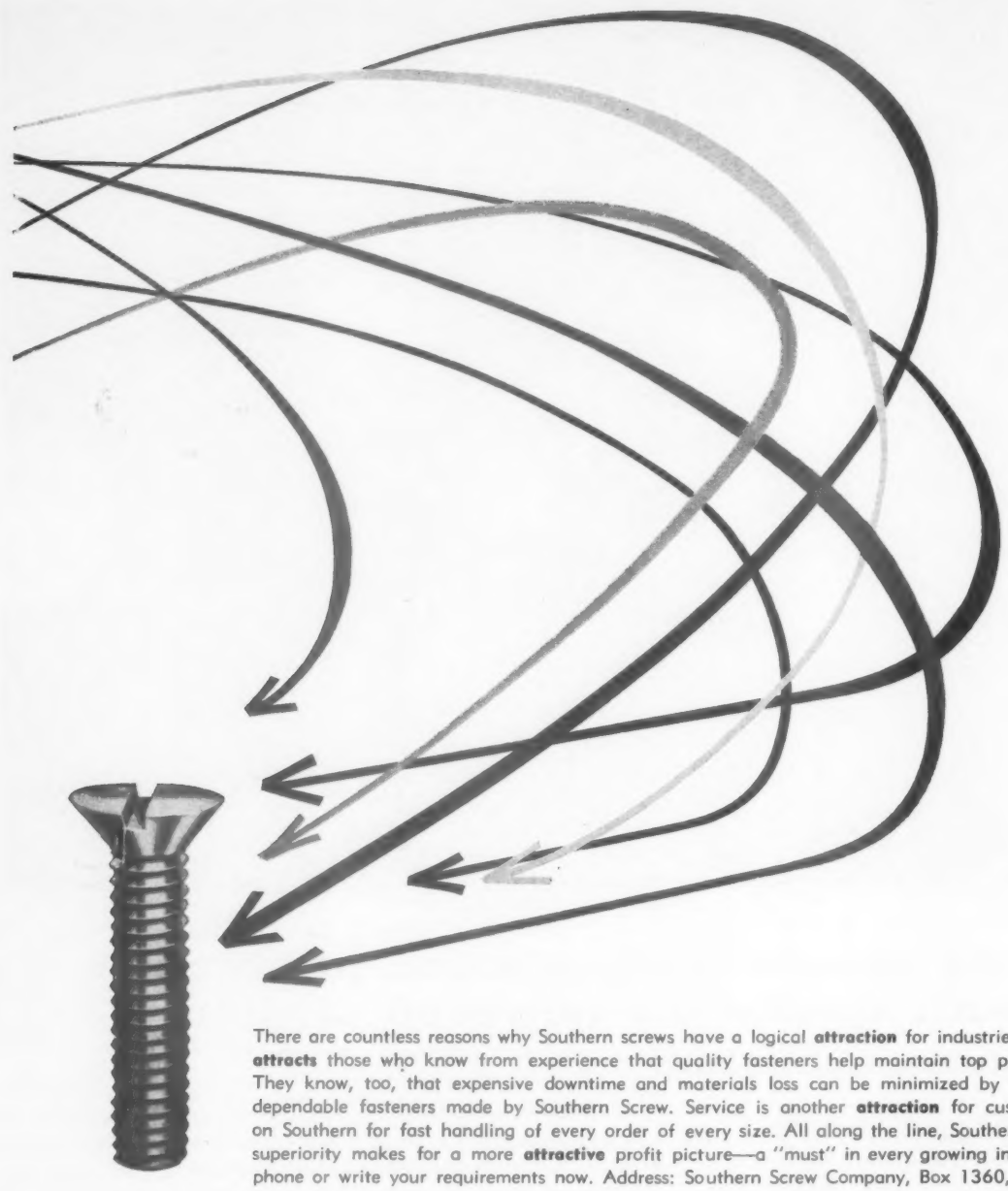

There are countless reasons why Southern screws have a logical **attraction** for industries. First, Southern **attracts** those who know from experience that quality fasteners help maintain top production speeds. They know, too, that expensive downtime and materials loss can be minimized by standardizing on dependable fasteners made by Southern Screw. Service is another **attraction** for customers who rely on Southern for fast handling of every order of every size. All along the line, Southern's unquestioned superiority makes for a more **attractive** profit picture—a "must" in every growing industry . . . Wire, phone or write your requirements now. Address: Southern Screw Company, Box 1360, Statesville, N.C.

IN FASTENERS SOUTHERN IS

ATTRACTION

Tapping Screws • Wood Screws • Machine Screws & Nuts • Stove Bolts • Carriage Bolts • Dowel Screws • Hanger Bolts • Drive Screws.

Southern
SCREW COMPANY
STATESVILLE • NORTH CAROLINA

Manufacturing and Main Stock in Statesville, North Carolina

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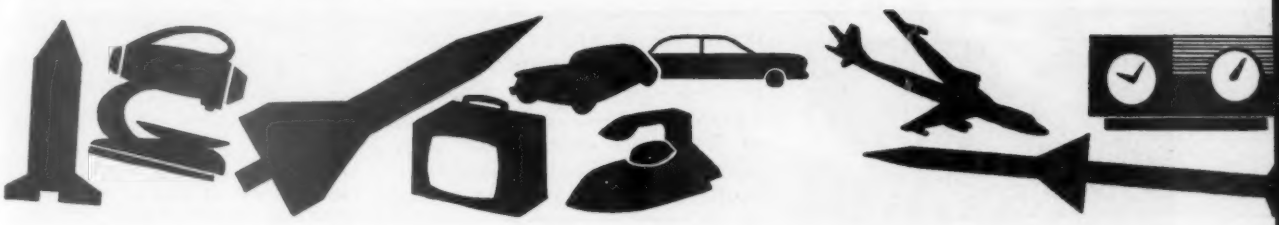
Industry at Work



TITANIUM RIVETED INTO DC-8 AIRFRAME GUARDS AGAINST CRACKS, DEPRESSURIZATION

A half-ton of titanium is built into the airframe of the 585-mph Douglas DC-8 jetliner. This represents the most significant use by a commercial airplane to date of the weight-saving and permanent corrosion resistance properties of titanium metal in application areas other than jet engines.

Titanium is used basically in:

1. "Rip stoppers". Bands of titanium are riveted at 18" intervals around the circumference of the forward section of the fuselage in a fail-safe pattern. Since titanium is more resistant to cracks than either aluminum or stainless steel, these "rip stoppers" guard against propagation of any crack and thus prevent sudden depressurization during flight. A high strength alloy (Ti-6A1-4V) produced by Titanium Metals Corporation of America was selected for this application.

2. Engine pods. Titanium, used to contain the engines, resists short-time temperatures up to 2000° F, at a weight savings of more than 500 pounds.

According to Douglas, the weight saving gained through titanium is equal to five passengers and their luggage for each of the 5000 flights every DC-8 is expected to make during its seven-year write-off.

United Air Lines, Chicago, the first to fly the new ship, estimates that the weight saved by titanium is equal to a half-ton of cargo. At mail rates, according to United, this amounts to a potential earnings of $525 for each coast-to-coast flight.

Employment of titanium in the DC-8 pods is an extension of the metal's first use in commercial aircraft. For example, Douglas has built titanium into every commercial transport since its first DC-8, where titanium in firewalls and nacelles yielded 200 pounds of weight savings.

Pratt and Whitney Aircraft, East Hartford, Conn., this month disclosed the millionth flight hour had been rung up on more than 5800 engines containing titanium components without "a single failure of any titanium part, either through corrosion or mechanical damage."

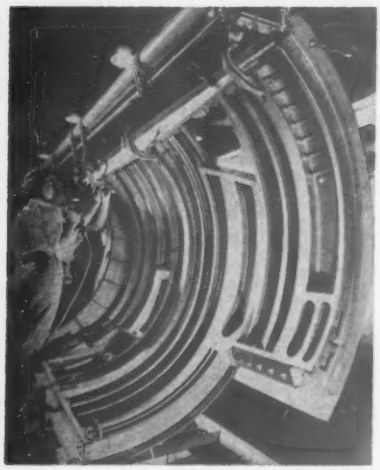
Use of titanium in the DC-8 also illustrates recent advances made in fabricating assemblies from

continued

Bands of titanium, riveted at 18" intervals around the forward section of the DC-8 fuselage, guard against propagation of any crack and thus prevent sudden depressurization during flight.

Titanium access panels, in position, are literally the doors through which DC-8's engines will be serviced for life.

titanium and brings into perspective the cost differences usually associated with titanium construction.



TITANIUM ACCESS PANEL which covers engine in DC-8, measures 102" x 76" and weighs 80 pounds. Each door is interchangeable with any pod built for a specific airline.

Ryan Aeronautical Company, San Diego, California, which fabricates the bulk of the titanium assembles employed in the DC-8 pods, has developed techniques of welding and machining titanium at costs roughly equal to fabricating steel. Thus, according to Ryan, the overall cost of a titanium assembly has been drastically reduced from what it was in the past.

Another factor in selection of titanium for construction of airplanes is the metal's permanent resistance to atmospheric corrosion. This is of importance to operators who expect 8 to 10 trouble-free hours operation of their aircraft every day, when maintenance means not only repair costs, but also downtime of expensive equipment.

Evidence of the quality of titanium construction is mounting!

CHRYSLER'S VALIANT features an aluminum recessed grille which, like most non-structural parts, is bolted in place for ease of maintenance. The new compact car is fabricated with 5300 spot and seam welds.

ITALY'S MACHINE TOOL INDUSTRY IS GROWING

Italy boasts a growing machine tool industry which in 1959 is far ahead of its 1958 pace. The industry does a gross volume of $60 million annually, employs 12,000, and exports $25 million. Recently designed were a long-arm radial drill and a hot ingot peeling machine.

REPUBLIC STEEL'S NEW ELECTROLYTIC COPPER-PLATING PROCESS COATS COLD HEADING WIRE

Republic Steel has installed what is believed to be the first electrolytic copper plating machine of its type in the cold-heading industry. The machine wraps stainless steel wire in a protective coat of copper .0002" thick. This coating serves as a lubricant in the cold-heading of fasteners.

The new system in the Massillon, Ohio plant replaces the method by which coils were oxide coated and drawn through a stearate compound.

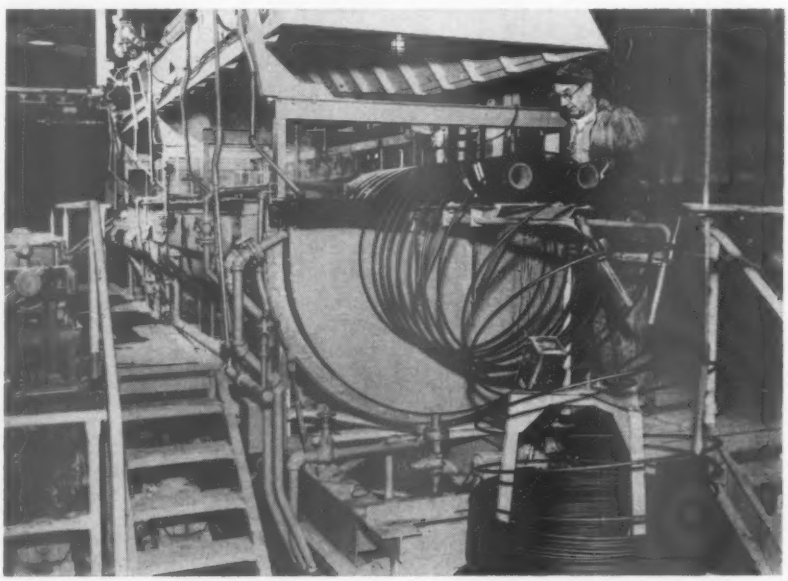
In the actual copper plating operation, the wire, ranging in size from .092" to .625" diameter, is fed through the plating machine in a single, continuous strand, pre-formed to a diameter of 36", which passes through the plating machine as a helix.

After degreasing and water rinses the steel passes into a solution which deposits a nickel flash on the surface of the stainless wire. This aids in producing a good bond between the copper and stainless steel. The strands then pass through another water rinse and a caustic solution to neutralize any acid which may remain from the nickel flash.

The wire then passes into the copper plating solution, the speed being regulated so that the wire will be in the copper solution long enough to build up a copper coat .0002" thick.

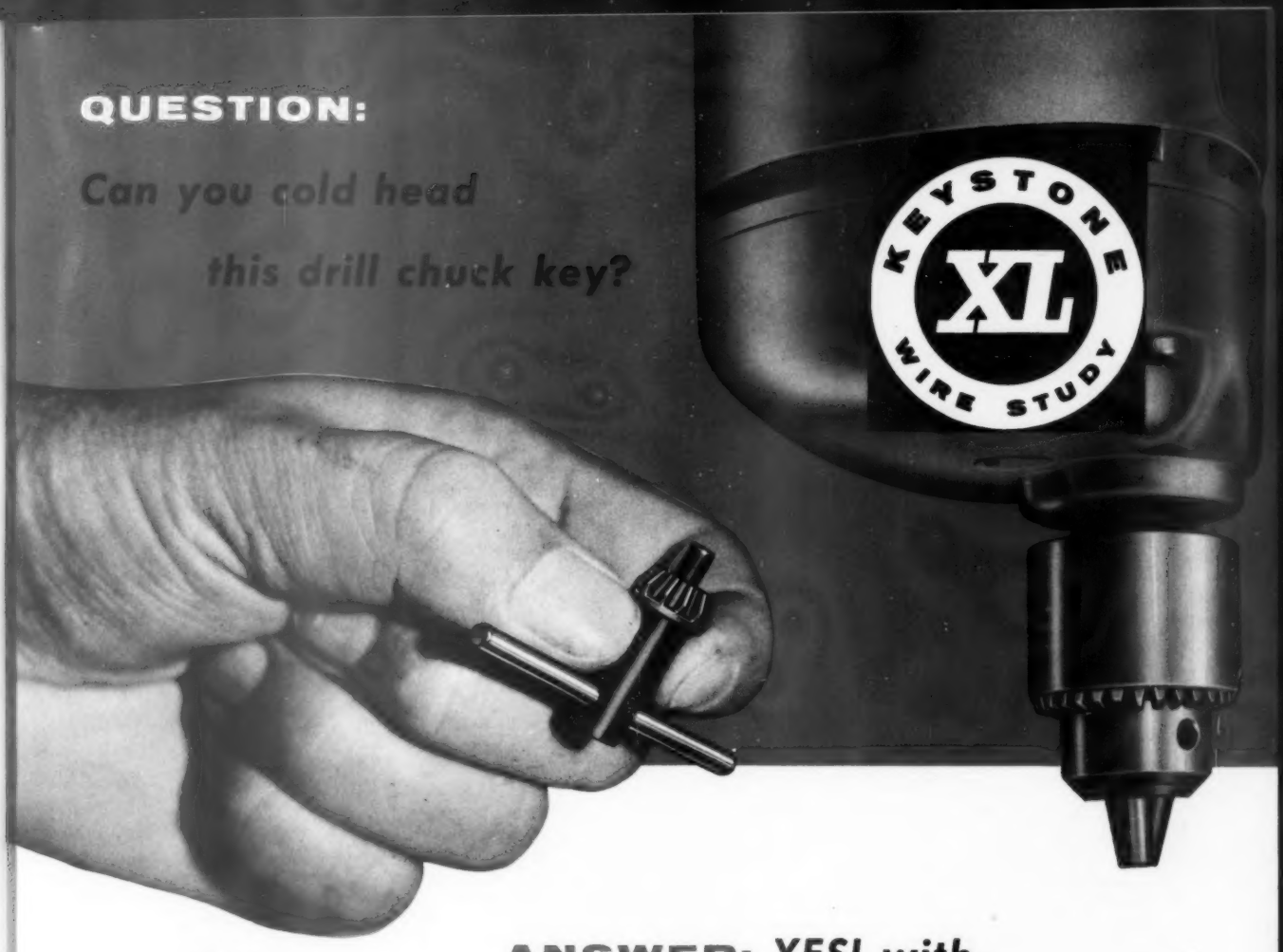
The final steps involve a cold and hot water rinse. The hot water evaporates quickly, drying the coils. Following the plating operation the coils are drawn through a stearate compound to finish size.

Republic Steel engineers indicate that the copper-coated wire is used mainly for the production of bolts, nuts, screws and other fasteners. They report that after such fasteners have been produced, they are usually dipped in nitric acid to remove the copper coating. •



QUESTION:

Can you cold head this drill chuck key?



ANSWER: *YES! with* CENTRAL SCREW COMPANY *engineering and KEYSTONE XL WIRE*

Questions like this are asked every day at Central Screw Co., Chicago, Ill.—and this is a typical answer! For Central Screw depends on Keystone XL Wire to head more than 7,500 stock items by the millions—and for many of its 20,000 specials. Here, as with many other progressive fastener manufacturers across the country—"know-how" combines with Keystone XL Wire quality and flowability to produce a superior product at sharply reduced costs.

For example, by cold heading this drill chuck key, gear cutting was eliminated and machining was reduced. Overall costs were cut about 50%. This is one of *millions* of examples of how Central's "Fasteneering"® profitably puts Keystone XL Wire to use. You can do the same. Your Keystone representative will help you. Call him!

Keystone Steel & Wire Company, Peoria 7, Illinois

Five operations now produce this chuck key: heading on a 2 blow header, cut pointing, drilling, chamfering and heat treating.
ACTUAL SIZE
More Central Screw examples of Keystone XL Wire flowability are (above) this fastener with an 8 diameter thin shell head, and (right) fastener with 6½ diameters in the sharp, clean head and square shoulder.

KEYSTONE

WIRE FOR INDUSTRY

FOR SEMS...BUY P-K®

All Types of SEMS and Pre-assembled Fastener-Washer Combinations

Whatever you require in pre-assembled washers... SEMS, and neoprene or nylon washer STAPS®... in thread-forming and thread-cutting tapping screws, or machine screws... with slotted, Phillips or Hex heads... P-K can supply them all through your local P-K Distributor.

P-K SEMS reach your assembly line pre-assembled, ready for instant use. Washers cannot come off—can never be mislaid or misplaced—insures washers on screws...not on the floor! Double inventory and double parts handling is completely eliminated.

P-K SEMS can be hopper fed for automatic driving. Inspection rejects due to omitted lock washers are impossible—fastenings stay tight and firm. P-K Sems assure concentric washer seating.

STAPS® are standard P-K fasteners, pre-assembled with nylon or neoprene washers for effective control of leaks, squeaks, crazing and electrolysis, in all types of metal structures and assemblies.

Your nearby P-K Distributor can meet your needs. Call him for samples and complete information.

PARKER-KALON® fasteners

Keep American Industry at Work . . . Buy P-K . . . made in U.S.A.

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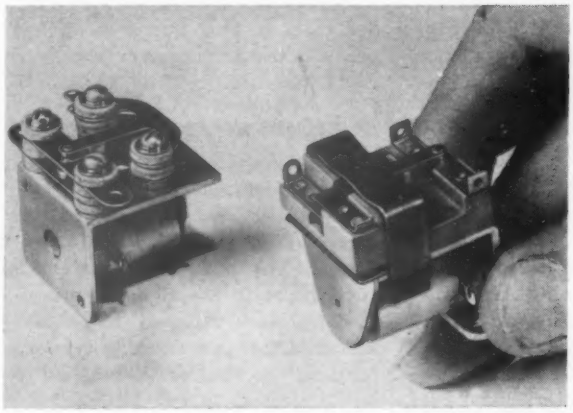
Assembly and Fastening Ideas



Assembly of FC-relays was speeded by replacing several parts with a one-piece clamp and molding.

CLAMP, MOLDING SIMPLIFY RELAY ASSEMBLY

A clamp and a molded plastic panel have increased the production rate 30% for a new general-purpose relay, manufactured by Allied Control Co., Inc., New York City.

In redesigning the relay, Allied engineers came up with several production shortcuts. A simple one-piece metal clamp (right) fastens the relay assembly rigidly to the supporting structure in one operation instead of four (left). The clamp is made of .312″ wide, No. 20-gauge spring tempered stainless steel.

By replacing fabricated phenolic washers with a one-piece phenolic molding, the design engineers also eliminated several time-consuming operations. The molded parts also provide greater thermal stability and greater rigidity to the new "FC" relay. Silver contact assemblies are riveted to the panel.

WELD STUDS ELIMINATE HEATER LOSSES

More than 50,000 glass-lined water heater tanks have passed through curing furnaces without loss since the Republic Appliance Corp., Erie, Pa., began using special rectangular end-welded studs as hangers instead of hand-welded stampings.

Strength of the weld and the Nelson studs is such that the studs may be bent flat to provide proper fitting of the outer casing.

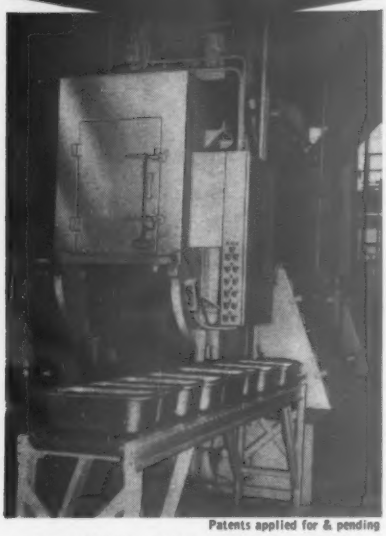
Kenneth Shaw, plant manager, points out that an additional cost-saving benefit of the studs is the fact that they are welded by an inspector. Formerly a full-time welder was needed to apply the stampings.

The studs, which are applied with a lightweight Nelson NS-10 stud welding gun, measure 3/16″ thick, 7/8″ wide and 1-5/16″ long. They have a special reduced base only 5/8″ wide and 9/16″ diameter hole to accommodate conveyor hooks.

After fabrication, tanks are assembled in groups

continued

Only INDUSTRIAL'S DRUM JET WASHER



Patents applied for & pending

CLEANS THE TOTE PAN AS WELL AS THE WORK
without separating one from the other in the process!

Such "togetherness" has long been the wish of producers of *screw machine products and other small parts* . . and Industrial's ingenuity has made this wish come true.

Industrial's exclusively designed Model DJ provides efficient washing, rinsing and drying of volume parts . . right in their own tote pans.

Now get thoroughly clean and dry tote pans as well as *screw machine products and other small parts* with no more mixed loads . . and no more subsequent re-sorting to steal time and run up costs.

ADDITIONAL FEATURES

- Rotational action is adjustable for variable high or low speed tumbling of work
- Washer processes 1 to 3 tote pans of work per minute and requires but one operator
- Machine is adaptable for complete automation
- Smaller production model also available

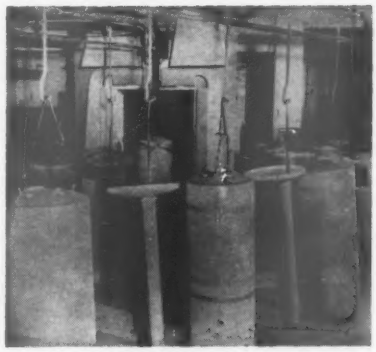
Don't delay *— write today for complete details and growing list of present users in your industry.*

ISC INDUSTRIAL SYSTEMS COMPANY

Exclusive Sales Agents for
INDUSTRIAL WASHING MACHINE CORP.
31 Main Street, Matawan, N. J.
Use postpaid card. Circle No. 217

of six or eight at a station where they are inspected. The tanks are then up-ended onto a steel ground strip 20 feet long and 2 feet wide. The inspector goes down the line and welds two studs to the head of each tank. By laying studs and ferrules on each tank beforehand, the inspector welds studs at the rate of six to eight per minute.

The Nelson studs were specially designed for extra strength while the tanks are being conveyed through the heat-treating furnace, where they are cured for seven minutes at 1600°F.



Tanks are conveyed through a heat-treating furnace where they are cured for seven minutes at 1600°F.

SOLDERING FLUX LICKS CORROSIVE FUME PROBLEM

A significant problem in many plants—corrosive soldering fumes whose acid damages stock and equipment—has been licked. The Blackstone Corp., Jamestown, N.Y. has developed a soldering and tinning flux which leaves no corrosive residue or fumes.

The product (No. 641) has been successfully tested for four years in Blackstone's own manufacture of auto radiator and heater cores. The company also reports an 82% decrease in acid burns requiring medical treatment since the flux went into use.

BOEING DRAW-FORMING TECHNIQUE SOLVES SWAGING PROBLEM

Ever try tapering a cylindrical cigarette paper down to pinpoint size without wrinkling, folding or tearing the paper?

This is comparable to the problem which faced Boeing Airplane Co. Its manufacturing research engineers had to reduce one end of a 2″ diameter .01″-wall tube down to ½″ diameter, working with M-252, a high-strength, heat-resistant alloy difficult to cold form.

The application for hypersonic vehicles required that structural members be joined.

Methods such as welding, clamping, riveting, sleeving—compatible to heavier materials such as stainless steel or aluminum—would collapse M-252. In addition, to permit any type of joining, the wall thickness had to be increased 300% without increasing overall weight.

The size of the tube had to be reduced to permit several struc-

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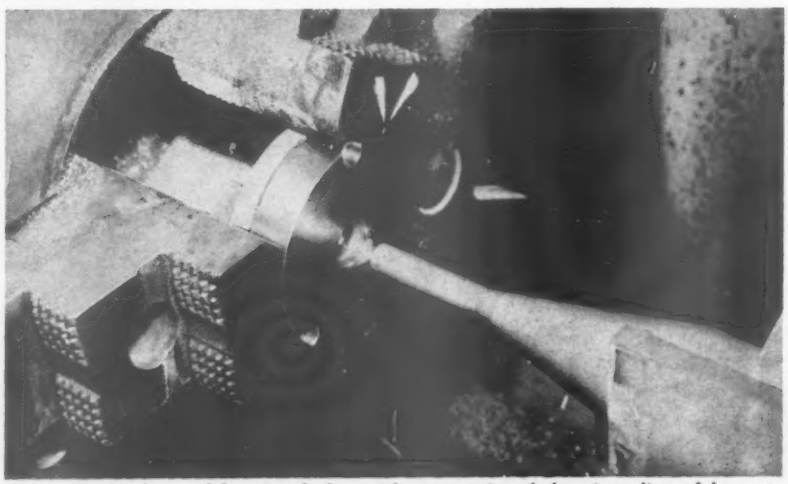


A standard tube end-forming lathe, with conventional drawing dies of bronze, was used by Boeing in developing the new method of swaging M-252 alloy.

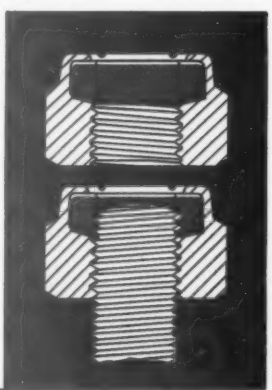
What's special about this STOP NUT?

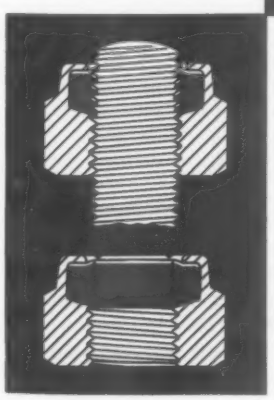
Several things make this nut unusual. For instance, you can "stop" it at any position on the threaded length of the bolt . . . or wrench it tight against the work where it protects bolt threads against corrosion and prevents liquid leakage. No matter where you leave it on the bolt, it will remain tight in that exact position, even though you subject it to heavy vibration and shock loads. But use a wrench on it and it comes off as easily as it went on. The red locking collar is nondestructive—does not gall bolt threads or remove plating. You can remove it and re-use it again and again.

What gives it its grip?

1 The locking collar is unthreaded and elastic. It has an inside diameter smaller than the major diameter of standard bolts.

2 The bolt impresses a mating thread into the collar and the resulting compressive forces exert a constant friction grip on the bolt. . . .





3 and exert a downward thrust bringing the lower flanks of the bolt thread into firm metal to metal contact with the matching nut threads, eliminating normal axial play.

4 Nut is removable and reusable . . . the Red Elastic Collar retains its grip after repeated usage.

Will it hold under ALL conditions?

The locking principle of the Elastic Stop® nut has been tested and proved by over 25 years of actual field service. Elastic Stop nuts are used on locomotives . . . and pile drivers. They fasten hedge shears and harvesters, drilling rigs and washing machines, trucks and roller skates. And no Elastic Stop nut customer has ever stopped using them because of unsatisfactory performance.

What about sizes and materials?

Elastic Stop nuts are available from a watchmaker's 0-80 all the way to 4"—in materials that include stainless steel, brass, aluminum and other alloys. Protect your product with "fastener insurance." Try Elastic Stop nuts on trouble spots, whether to protect expensive heavy equipment from costly downtime or to guarantee the accuracy of delicate electrical equipment by maintaining precision adjustments. We'll supply free test samples.

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Depts NB2-1297, 2330 Vauxhall Road, Union, N. J.

Please send the following free fastening information:

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☐ Here is a drawing of our product. What self-locking fastener would you suggest?

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JUST WHAT YOU WANT...

Standard and Special Washers for Every Purpose....Sizes, Shapes, and Materials to meet your requirements

Whether your immediate need is for tiny brass washers averaging 588,000 to the pound—or massive washers 23¼" in diameter, weighing 21 lbs. each — Wrought Washer *has* or *can produce* just what you want, to your specifications. Over 100,000 sets of dies are available to you without extra cost. If your specifications happen to match any one of them, the cost of new dies is eliminated.

As the world's largest producer of washers, we offer you a dependable source of supply for the washers and stampings you need — anything that can be punched out of metal, plastics, fibre, and other materials—within the practical limitations of mass production.

You, as a user of washers, are assured of *highest quality* at competitive prices. Send us your specifications so that we may quote on your washer or stamping requirements. Write for Catalog 40-B if you do not have a copy.

All Standard and S.A.E. sizes are available in 1-lb. and 5-lb. boxes as shown here and in 100- and 200-lb. containers for bulk orders.

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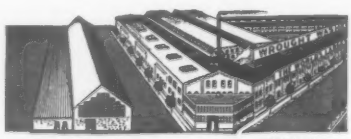

A9-9700

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tural elements to be joined in several different planes at a single point. Both goals could be accomplished by decreasing the diameter of the tube at the joint.

Boeing turned to swaging and a draw forming technique. Aluminum tubing which would not collapse during reduction was nested inside the welded M-252 tube. Both were swaged at the same time, then the aluminum removed and discarded. Over a period of weeks, buckling, cracking, wrinkling, bulge and flare problems were overcome.

An eight-stage reduction with inter-stage anneals finally produced a tube smoothly tapered in a 10° angle to ½" diameter. It was thickened 33%.

PUTTY-LIKE ADHESIVE SETS WITHOUT HEAT OR PRESSURE

Liquid iron adhesive and sealer, which easily bonds this chair to the wall, will repair most everything from a broken chair leg to a cracked engine block.

An adhesive for both household and industrial use will retain its strength from zero to 300°F. No heat or pressure is needed.

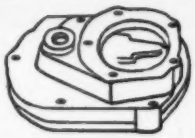
Chrysler Corporation's Cycleweld Chemical Products division has developed a putty-like synthetic plastic that sets up into a hard substance a few hours after being mixed with a clear liquid hardener. Application of heat speeds up hardening to 15-20 minutes.

Iron, bronze, wood, aluminum, brass, porcelain, marble, glass and other materials can be bonded.

The product is non-shrinking, non-expanding, withstands mild acids and alkalis. It can be painted, ground, sanded, shaped, filed and drilled •

The quickest most practical way to put strong threads in soft materials the TAP-LOK® INSERT

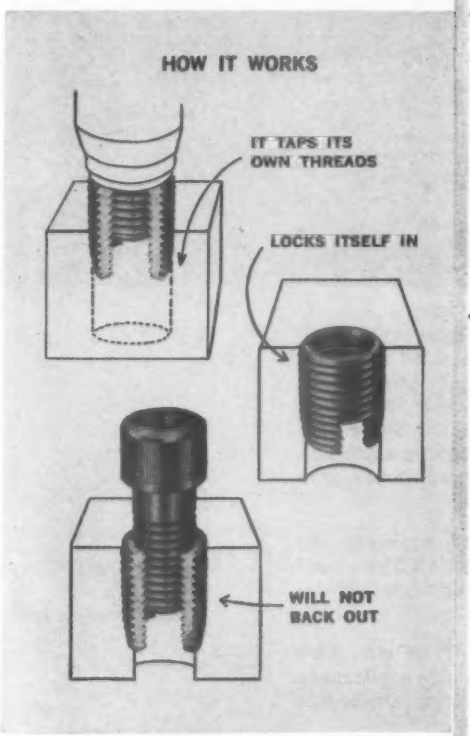
FOR SOFTER METALS AND PLASTICS . . .
Slotted TAP-LOK insert has full V-form external threads to provide maximum locking torques; permits wide choice of mating hole sizes. Recommended for soft aluminum, zinc die castings, sand castings, and plastics. Meets requirements of MIL-MS 35914.



FOR HIGHER STRENGTH MATERIALS . . .
H-Series heavy-walled TAP-LOK insert has truncated root external thread and three-hole cutting edges for hard-to-tap higher strength materials and to meet MIL and other specs calling for Class 3B thread fit for gaging after installation.

FOR SPARK PLUG SOCKETS . . .
P-Series TAP-LOK insert was designed to eliminate thread wear and renew damaged threads in spark plug sockets in aluminum cylinder heads. Available from stock for standard plug sizes to meet most needs.

FOR WOOD . . .
W-Series TAP-LOK insert has coarse pitch external thread offering maximum strength in combination with ability to be driven into thin sections without splitting them. For furniture, cabinets, and other wooden parts where strong, permanent threads are needed, or which must be frequently assembled and disassembled.



The TAP-LOK® threaded insert taps its own thread and locks itself into the parent material in a single, quick operation. Designed as a permanent fastener in materials which are machinable but not strong enough to sustain applied loads in threads tapped directly into them, it is also widely used in harder metals and alloys where repeated assembly makes thread wear a problem.

Since TAP-LOK cuts its own threads, no additional assembly time is required, *making its installed cost the lowest of any threaded insert!*

Once installed, it is permanently locked in place, and will not back out under repeated heavy shocks or prolonged vibration. TAP-LOK inserts are available in the types shown at the right, in a variety of metals that include casehardened carbon steel, brass and 18-8 stainless steel (type 303). For complete information and prices, write Groov-Pin Corporation, 1135 Hendricks Causeway, Ridgefield, N. J.

TAP-LOK *Another fastener development from—* **GROOV-PIN CORPORATION**

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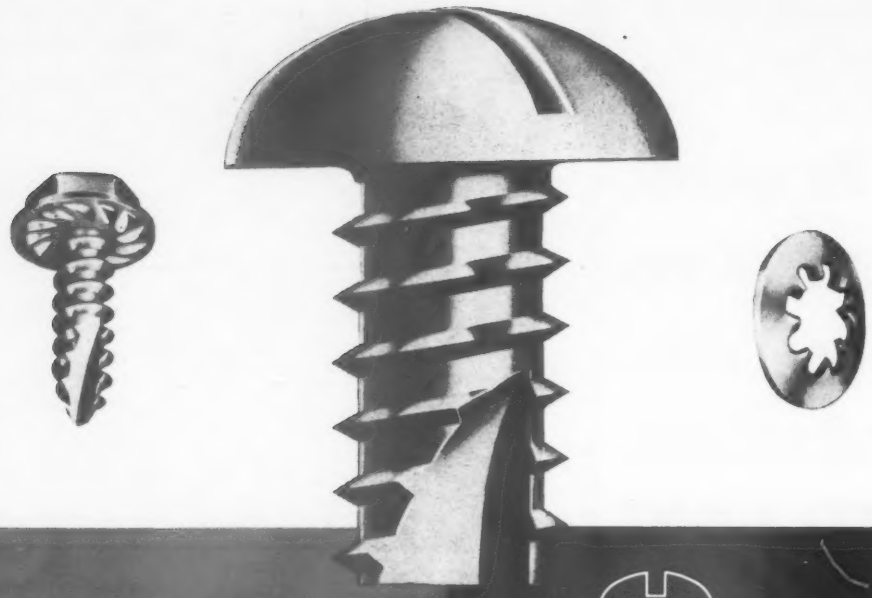
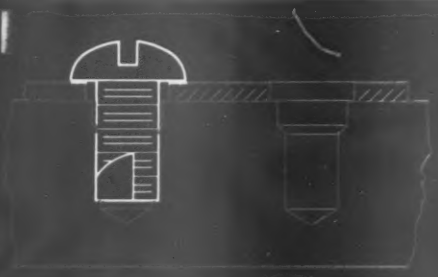


HOW TO SELECT COST-SAVING

fasteners for plastic



A TYPICAL EXAMPLE:
Cuts its own thread—

Shakeproof's® Type 25 Thread-cutting Screw saves time because it eliminates tapping. Blunt point assures maximum thread engagement and high holding strength when driven into a relatively thin panel.

Shakeproof has pioneered in developing ingenious, cost-cutting fasteners for plastic applications. The screw featured above not only taps its own hole—often it eliminates costly threaded inserts. Another Shakeproof development, the Type 17 self-drilling Nibscrew®, both drills and taps as it is driven. A Shakeproof Dished Lock Washer compensates for differential in expansion between plastic and metal . . . temperature changes won't loosen the assembly.

For highest quality fasteners that assure faster assembly and lower costs investigate the Shakeproof line. There's a Shakeproof fastener to meet your need—or Shakeproof engineers will develop one for your specific application.

WRITE FOR NEW SHAKEPROOF BULLETIN NO. 300
Shakeproof Bulletin 300 shows ten typical, profitable applications of Shakeproof fasteners on products using plastics. Offers free samples for testing. Send for your copy now.

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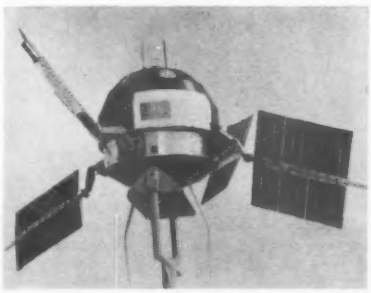


Paddles opened 150 miles above the earth, began conversion of sunlight into electrical energy.

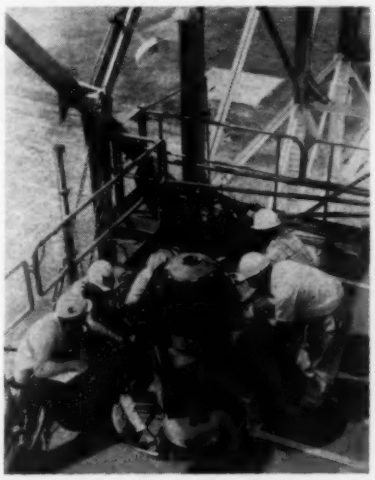
With paddles in down-and-locked position, Explorer VI is check-fitted to aerodynamic fairing which will protect payload during first two stages of flight.

BONDED HONEYCOMB PADDLES HOUSE SATELLITE POWER PLANT

Thanks in part to adhesive bonding, the United States is receiving data from its Explorer VI satellite orbiting 23,000 miles above the earth.

It was recently revealed that the distinctive "paddle wheels", originally thought by the public to be connected with the forward motion of the craft, actually house the power system for Explorer's communication.

Produced in just three weeks time by Fabricel Division of Poly Industries, Inc., the 20″-square paddles are made of lightweight aluminum honeycomb. Some 8000 solar cells are bonded to the honeycomb surface. The silicon-based cells charge special nickel-cadmium batteries which supply 40 watts of power to radio transmitting equipment. Forty watts represents the approximate output of a standard public-address system.



Technicians perform final assembly of payload prior to installation atop third stage of Thor-Able missile at Cape Canaveral's launch stand 17-A.

Poly president Leo I. Kaplan points out that the use of honeycomb structures saved a vital four pounds in the total satellite weight of 144 pounds.

TYPEWRITER BAR SOLDERING GOES TO INDUCTION HEATING

A recent installation by Radio Frequency Company, Medfield Mass. for Commercial Controls Corp., Rochester, N.Y., a subsidiary of Friden, Inc., of an RFC high frequency induction heater, has taken over the job of soft soldering type slugs to type bars on typewriter type bar and segment assemblies, and has improved quality and increased production.

Amazingly enough, a pull test, which measures the force necessary to separate the soldered pieces, also showed an increase,

continued

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using the same solder and flux originally used with gas.

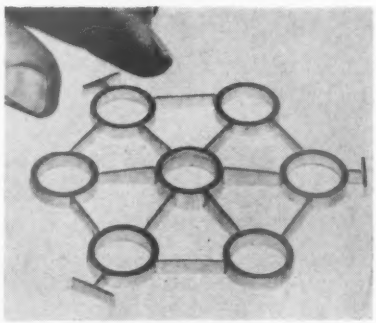
A 100% increase in production was achieved when the type bar and segment assemblies were checked on the comparator. The force of the gas flame had evidently been instrumental in forcing the slugs out of position while soldering, necessitating more time for aligning the type on the comparator.

REDESIGN PART TO USE BRAZING CUTS COSTS 70 PER CENT

Redesign to use brazing resulted in a 70% reduction in manufacturing and material costs in the case of a stainless steel fuel cluster rod separator in an atomic reactor.

The form was originally machined from a solid block of Type 302 stainless.

Now, 25 single stampings and screw machine parts are simultaneously brazed in a pure dry hydrogen furnace at 2150°F using Nicrobraz brazing alloy, a nickel base stainless type.

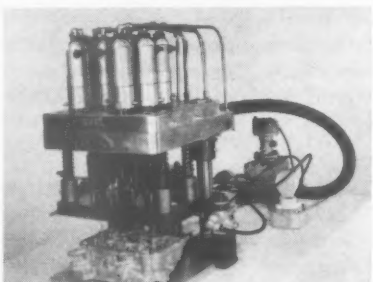


Prototype of a brazed fuel cluster rod separator designed for use in an atomic recator. The part was formerly machined from a solid block of Type 302 stainless steel.

AUTO CARBURETOR SCREWS AIR-DRIVEN AUTOMATICALLY

A highly-sensitive 12-spindle pneumatic screwdriver has been designed and produced by Cleco Division of the Reed Roller Bit Company for screw-tightening on several carburetor types being installed on some of the more popular automobiles.

The four-barrel carburetor has a total of eight screws which must be tightened to exacting torque specifications and thus eight screwdriver motors are employed at one time. However, because different carburetor models have variously spaced jets and screws, the screwdriver is equipped with 12 motors to handle any combination.



Twelve-spindle air screwdriver tightens screw on carburetors of several American automobiles with precise torque.

After jets and screws are placed loosely in the body, the carburetor assembly is placed on the bottom plate locating on dowel pins. The operator depresses both thumb valves, the air motors begin running, the entire head asembly lowers, bits engage and eight screws are run down to predetermined torque. Motors stall individually.

A time sequence valve allows an interval to assure that all motors are stalled. Air pressure is then released and an air cylinder is automatically triggered to raise the head off the completed carburetor assembly.

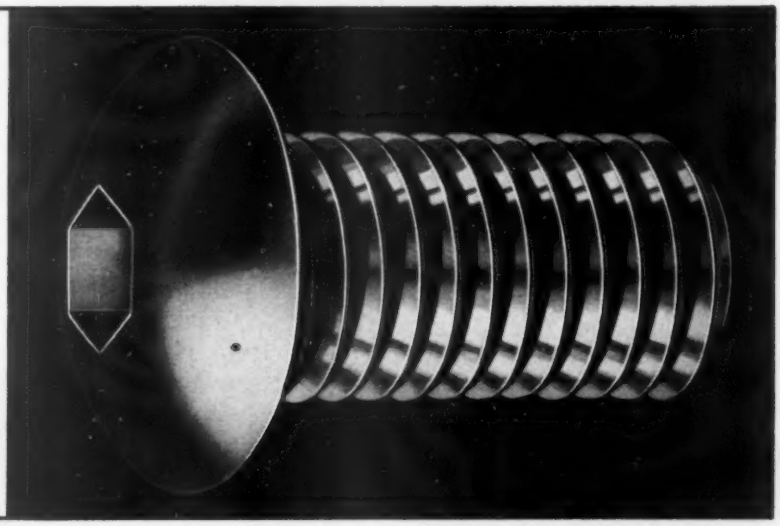
The Model 1210-55 operates on complete cycle time of five seconds, without loading time. This cycle time can be varied as desired with the sequence valve adjustment.

The regulator is set to 60 pounds air pressure and the motors are regulated with metering valves to produce 25-35 inch-pounds of torque. A warning light prevents production of assemblies with screws below torque requirements.

Any pattern of spindles can be installed in the top plate with appropriate fixtures below. •

Problem:

"Fasten thin metal parts where countersinking is impractical. Product is to have smooth, streamlined surface, so fastener head must be low and rounded. Fasteners must be removable . . . must stand up under repeated removal and re-tightening . . ."



Solution:

HOLO-KROME BUTTON HEAD CAP SCREWS. Made of special analysis alloy steel heat-treated to 38-42 Rockwell "C" hardness. Sockets are scientifically proportioned for highest strength . . . especially important in shallow button head sockets. Internal Hex socket drive assures a smooth, unmarred head. New forging method results in improved fiber flow, tougher screws. Threads are Unified Class 3A fit.

For the finest in Hex Socket Screws . . . for unmatched Same-Day Service, the name to remember is Holo-Krome.

HOLO-KROME SOCKET SCREWS

THE HOLO-KROME SCREW CORPORATION • HARTFORD 10, CONN.

SOLD ONLY THROUGH AUTHORIZED HOLO-KROME DISTRIBUTORS

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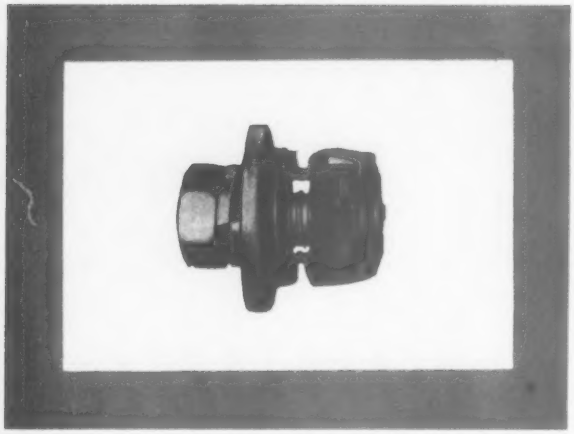
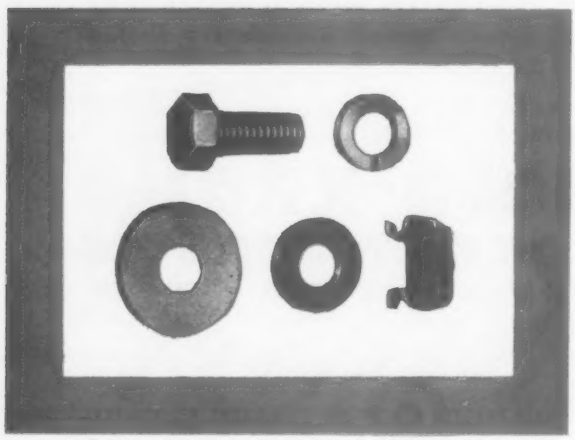
By adapting design to proven standard components, this manufacturer turns out refrigerators which are not only stylish but also dependable in service.

STANDARDIZATION AT QUICFREZ



Cage nut assemblies are slipped into radially slotted holes from below compressor mount (middle view). One basic design serves as universal self-centering mount for all sizes of units. Exploded and assembled part views are shown.



by **Darrell Ward,** Engineering Editor

Quicfrez, Inc., was the name adopted in November 1952 for the former Sanitary Refrigerator Company formed in 1916. The first Sanitary electric refrigerators were produced in 1926, the pioneering days in the sale of electric refrigerators. The first Quicfrez home and farm freezers were introduced in 1939. Besides prolific war production experience, the company has distributed its products nationally and internationally. And, as the original supplier of refrigerators to the mobile home industry, experience was gained in the development and production of refrigeration equipment which could perform reliably under the most adverse conditions.

Dale Ashton, president of Quicfrez, told his people at a recent conference, "Since we cannot carry on an extensive research and development program such as a few other manufacturers can afford, we must do the next best thing. We must rely on what has already proved successful. We must standardize on every item and method possible and adapt it to our requirements."

This philosophical but realistic attitude seems to justify the company's claim that their units incorporate the latest trends in modern high-fashion styling and construction features that provide convenience and dependable service.

A quick look into the Quicfrez plant at Fond du Lac, Wisconsin, will disclose a few interesting highlights on this company's use of standard parts and fasteners to develop functional elements and styling which comply with their advertising claim.

Roller conveyors are used throughout the plant for transfer of units from one work station to another. Each unit is mounted on its own skid which, at the end of the line, serves as the base for a shipping carton.

At one of the few stations where a unit must be changed from its normally upright position, a "merry-go-round" fixture rotates the units ". . . instead of having a man stand on his head . . ." to apply asphalt protective coating on steel coils.

Convenience to worker as well as convenience to assembly problems is applied in another mechanical feature more directly related to standardization. This is the common, often vexing problem of mounting similar but various sizes of large components.

Because of volume and work flow, the line carries mixtures of different size units and even different types of units throughout the day. Providing different size compressor mounts for each would be costly on moderate production runs. Making many different sizes of the same part available to assembly workers would be as much of a problem in materials handling and space.

This kind of situation was reduced to a common denominator by standardizing on a single compressor mount made of H-type cross bracing with angle rails. The rails are punched with slotted holes which radiate out toward the corners from center. At first glance, these rails are nothing unusual. But, they are wider than would be necessary merely for strength or to accommodate one size compressor. And, the radiating slots serve as self-aligning holes for all sizes of units.

For further convenience in mounting compressor units, cage nuts are inserted in the slots. The spring clips of the cages retain the nuts in position below the rail slots, but grip loosely enough to permit sliding. It then becomes an easy matter for a worker to lift a compressor into approximate position, drop a cap screw and washer assembly down through the motor base holes, and start the screw into the cage nut below. With one hand on the screw, ready for turning, the other hand can "feel" the nut into position without difficulty. The combination of slotted holes in the rails and play of the nut in its cage results in quick alignment of the compressor and self-centering of the nuts as the 5/16-18 x 3/4" cap screws are run up with an air powered wrench.

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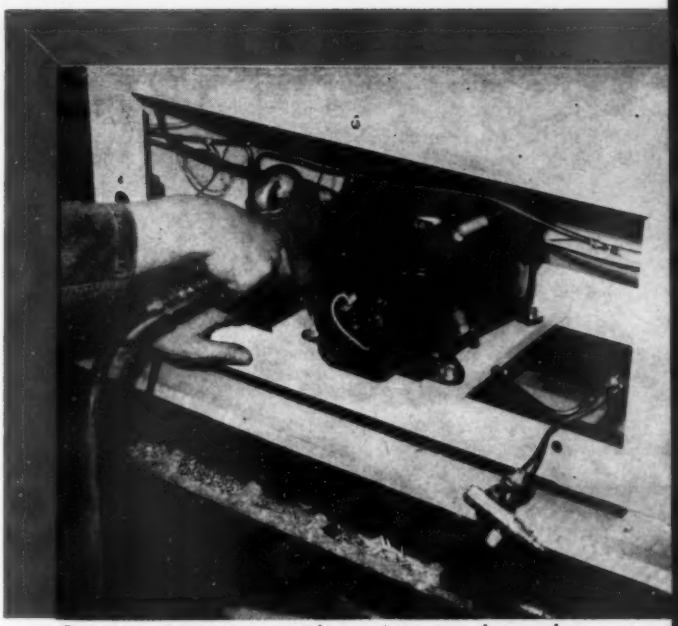
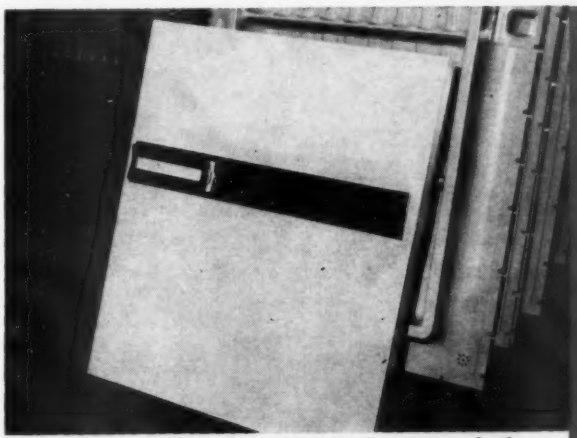


Cap screws are run up with an air-powered wrench in the mounting of compressor units.



A one-door panel made on contract is pre-punched for name plates. Customer slits a small opening in the packing case, plugs in his name and reships.

A standard pattern of "decorator trim" molding pops into place to hold an ornamental panel. Die cast brand name plate plugs into place with studs held by tubular clips.

Cage nuts formerly were special fasteners. But, they are now standardized because of their proven value in service. Standardization of fasteners by adapting basic design to their application, instead of taking a more obvious but less economical tact in designing special fasteners purely for the sake of aesthetic engineering, illustrates the more practical thinking at Quicfrez. Following Mr. Ashton's fundamental policy, it is a case of Mohammed going to the mountain.

The same thinking carries through into design and fabrication of sub-assemblies as well as fasteners. A good example is found in the evaporator doors of standard refrigerators. These are the small doors which cover the freezer compartment at the top,

A standard vendor handle is retained on door with standard screws driven from inside door panel.

With a rotating fixture on the conveyor line, units can be turned for coating of steel coils with corrosion-resistant asphalt mixture.

the half ornamental-half functional part which some manufacturers seem to use more as an elaborate display of artistic design talent than functional examples of good engineering. These parts at Quicfrez certainly display excellent styling, but, what is more important, styling is based on the standardizing approach and every piece of material or fastener that goes into these doors is a readily available stock item from suppliers.

The only thing related to "specials" in this design is the artistic picture frame molding, an extrusion now standardized at Quicfrez since it can be adapted to any size frame. The remaining door parts include a standard pattern of .040" embossed sheet aluminum rear panel, another standard pattern for the front panel, assembled with handle and hinges, the latter two being stock items from National Lock.

The whole door assembly is held together with standard sheet metal screws after a fiber glass insulating blanket is inserted inside. The fiber glass material, itself, is a stock item which comes in rolls to be cut to size on the job.

The major refrigerator doors are larger examples of stock item components employed to consolidate good styling with easy and economical assembly. Door handles are stock items which are retained with 10-32 Phillips head machine screws driven from inside through masonite spacers, reinforcement plate and door panel. Ornamentation on the outside is a simplified adaptation, again, of standard pattern anodized sheet aluminum panel mounted with standard retainer strips and decorator trim. Retainer strips are held with sheet metal screws. The stainless trim frame pops into place with blows from a soft-faced hammer.

The one special item in this sub-assembly is the die cast name plate. Even this is standardized to some extent by designing it with studs on the back which press into tubular clips in the holes of the door.

Further standardizing is accomplished in this detail when units made for other manufacturers are shipped complete, except for name plates. These contract customers do not even have to uncrate the units for reshipping. They know the exact location where a door can be cut in the corrugated fiber of the shipping crate, install their own name plates, and close the opening to make it ready for market.

An interior examination of a Quicfrez unit in any model or series will bring to light a wealth of standard fastenings adapted to mechanical requirements without any sacrifice of appearance. A typical upright freezer, for example, shows a vacuum formed plastic inner door panel retained with standard gasket clips. The main door closes with stock item door catch framed with a standard escutcheon.

The front part of the freezer plates (shelves made up of welder coils and wire) are held with standard tube clips, sheet metal screws and plastic spacers for thermal breaks. The rear of these shelves is slipped into supplier molder plastic shelf sup-

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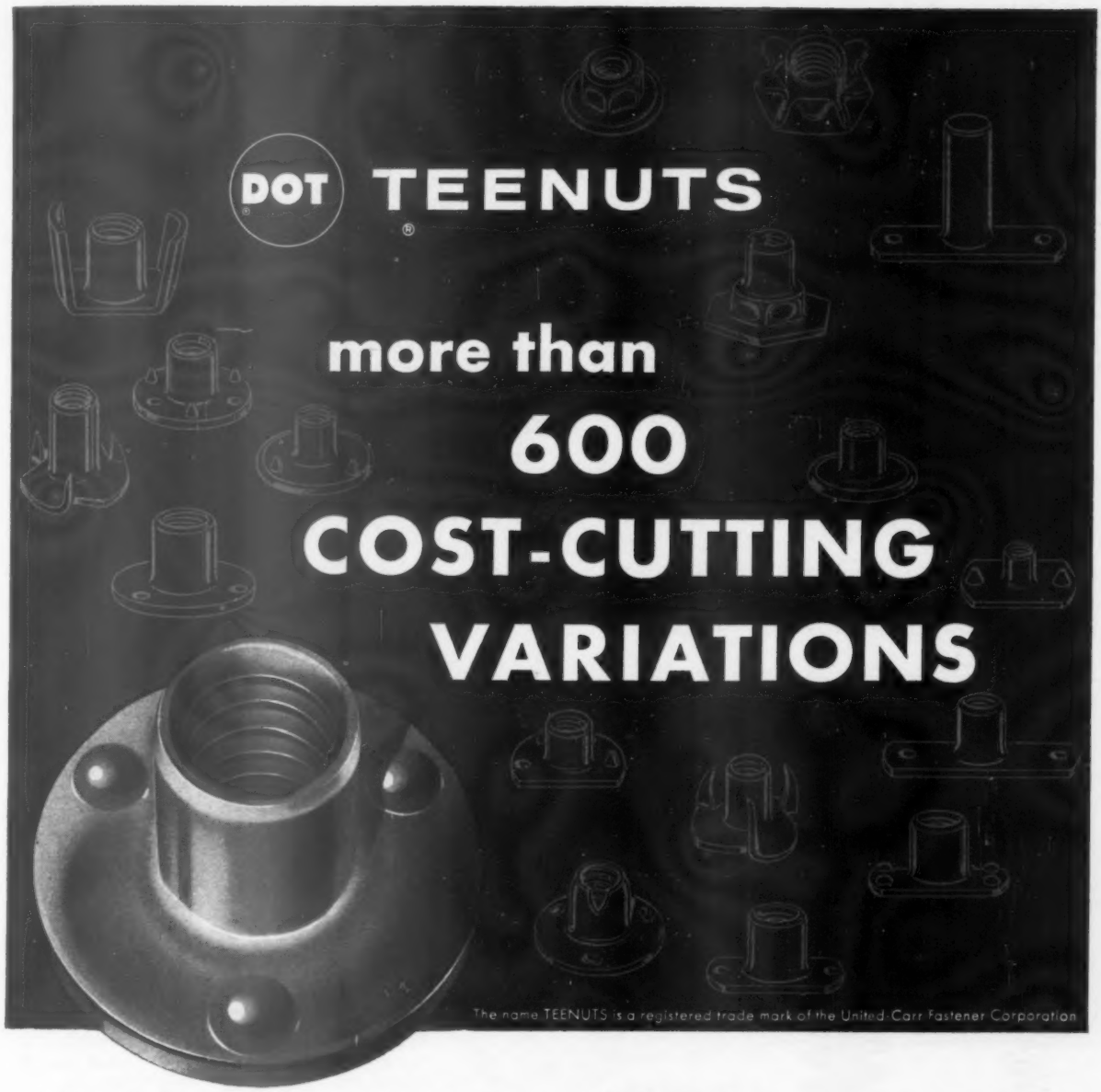

Since the first TEENUT was developed by Carr Fastener in 1927, more than 600 different modifications of this extremely versatile device have been designed and manufactured in true, mass-production quantities.

By combining nut and washer in one solid unit, the DOT TEENUT offers exceptional strength and security and eliminates the need for tapping. Its flanged base can be formed with welding bosses for attachment to sheet or solid metal structures . . . with prongs for wood . . . or with any number of different special bases for particular applications. DOT TEENUTS can be made in heat and corrosion-resistant materials and they can be provided with moisture-seals and vibration-proof, self-locking barrels.

Once mounted, the DOT TEENUT stays put and can't be lost or mislaid . . . an advantage at any time and a necessity where blind fastening is required.

Wide experience in the proper application of DOT TEENUTS and a multitude of other special-purpose fasteners enables your DOT field representative to provide prompt and effective solutions to a tremendous variety of fastening problems. Where special design work is needed, he can bring you the services of a design-engineering group unequalled in its field.

The DOT TEENUT catalog is an invaluable reference . . . yours on request.

MAKERS OF DOT FASTENERS

CARR FASTENER COMPANY

Division of UNITED-CARR Fastener Corp., Cambridge 42, Mass.

Offices In:

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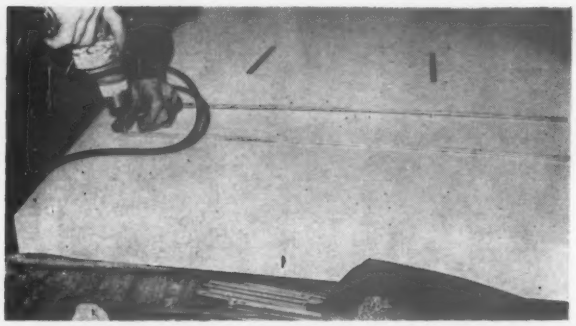
Standardizing at Quicfrez, continued

ports. Adjustable shelves are held with molded plastic supports, a standard vendor item screwed to the inner liner.

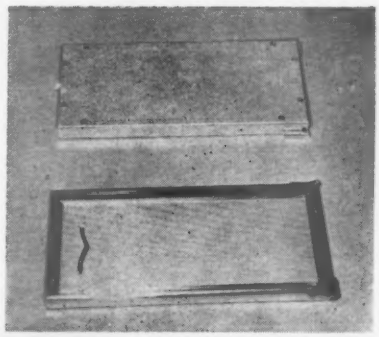
Corner trim around the door frame is retained with one Phillips head sheet metal screw at each corner. The barrel assemblies for the door lock are stock items. And, finally, the feet on which the whole unit stands are large head 5/16-18 x 1-1/4" standard leveling screws from many suppliers.

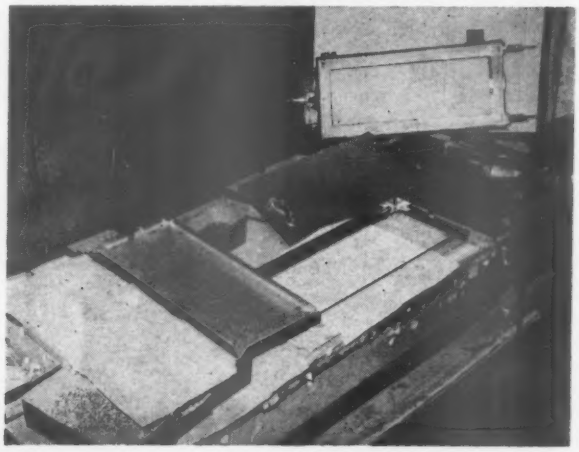
The sum of the situation we found at Quicfrez certainly seems to conform to president Ashton's well defined policy. The company manufactures reliable products with over 90% standard parts and fasteners. And no sacrifice is made in styling.

Standard retainer clips are held to door with standard sheet metal screws.



Evaporator door (right) makes no compromise in styling to use all standard parts (below): fiber glass blanket, sheet aluminum, handle, hinges, frame molding, fasteners.





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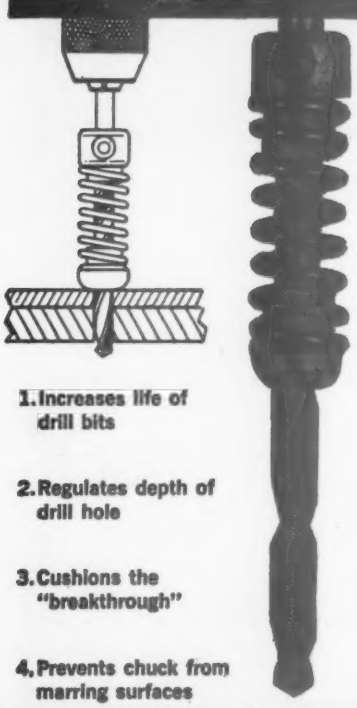

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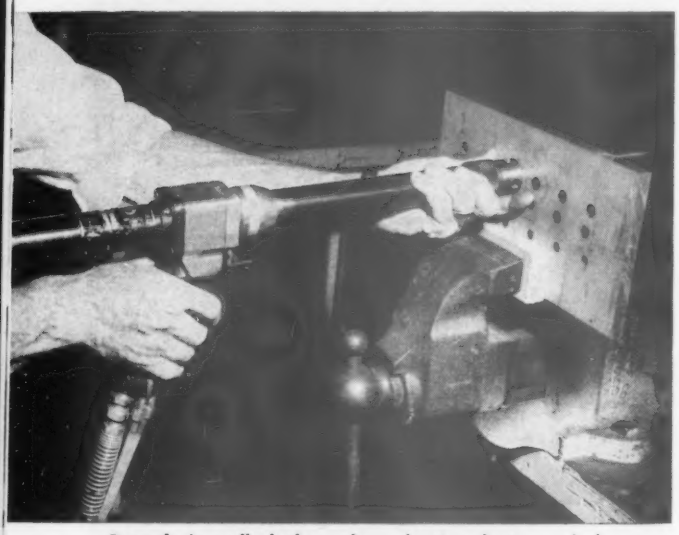
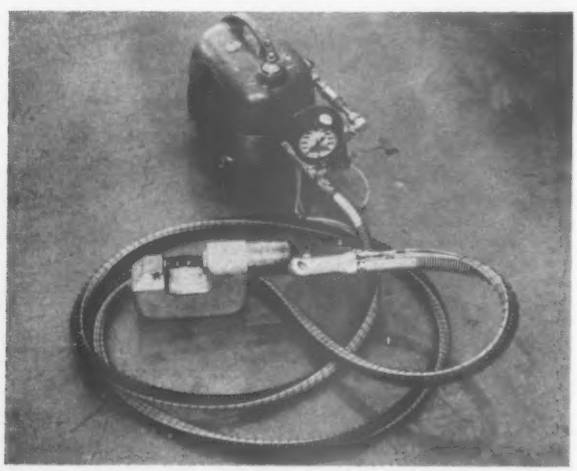
Lockbolt gun pulls tapered pin through stainless bushing inserted in undersize hole. The pin expands the bushing in the hole to the proper size. After removal of bushing, the hole presents a mirror-like internal finish.



Broach is pulled through undersize fastener hole, producing close hole tolerance and excellent internal surface.



This portable machine is used to coin groove around holes. During the operation, metal around the hole is work hardened, increasing its strength and fatigue properties.

by **Glen Ayers**
Instructor, Fastener School
Long Beach Division
Douglas Aircraft Company

To eliminate possible points of stress concentration around fastener holes, Douglas Aircraft employs coining, broaching and hole expansion techniques

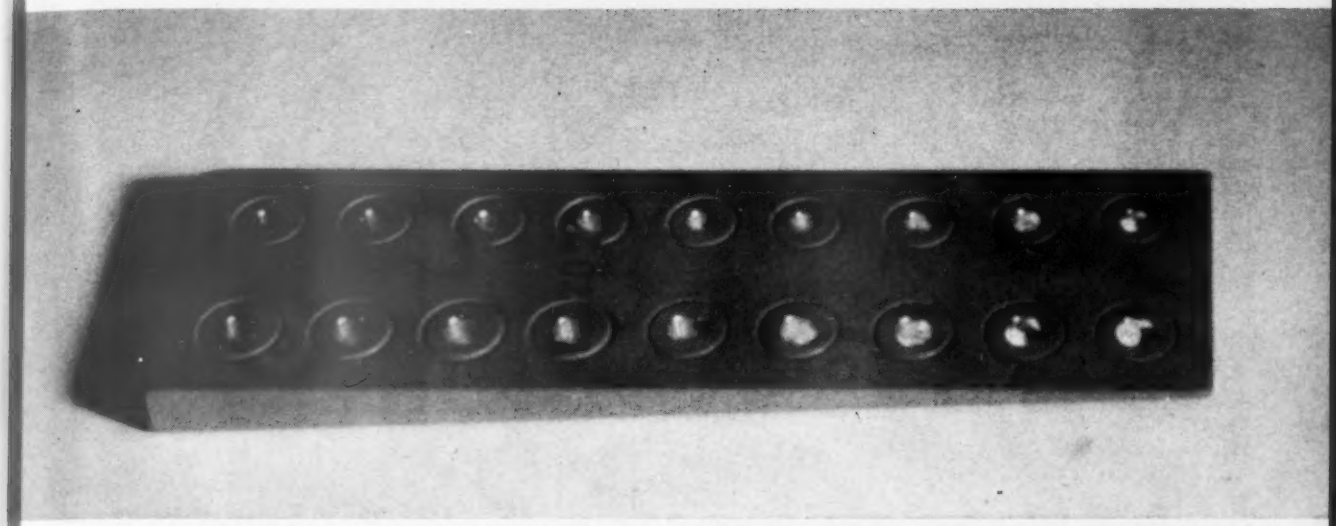
PREPARING HOLES

Aircraft and missile construction is making ever increasing demands on the various technologies involved in their fabrication. Stress loads of unprecedented magnitude are being imposed on structural members. In turn, these members must be joined together by fastening techniques of sufficient strength to transmit these loads from member to member and do it consistently under conditions of severe dynamic vibration, and without danger of failure.

It is true that fasteners are available for this purpose with sufficient strength and a margin to spare. High shear rivets and high tensile strength bolts are examples to quote. The problem, then, is to install these fasteners in a manner to secure the ultimate benefits from their strength. This implies a lot more than merely drilling a hole, inserting the fastener, and securing it.

To begin with, when installing a high strength fastener in a highly stressed joint, the installation techniques should include some method for increasing the strength of the structural metal in the immediate vicinity of the fastener hole. Work hardening by plastic movement of the metal immediately surrounding the hole is the only practical method to accomplish this.

Secondly, and because of the tremendous stress loads often involved, every possible point of stress concentration should be eliminated from and around the fastener hole. Tool marks left by an ordinary drill are representative of defects which are totally unacceptable in this case. Such tool marks may become points of stress concentration which, aggravated by vibration, will result in rapid metal fatigue and failure. If at all possible, the interior of the fastener hole should be brought to a mirror finish before the fastener is installed.



Here is a highly stressed and tapered DC-8 jetliner part after coining around the fastener holes. Holes are finish drilled after coining as there is some extrusion of metal into the hole area. Note "mirror" reflection in holes.

FOR HIGH STRENGTH FASTENINGS

During design of the new DC-8 jet transport airplane at the Long Beach (California) Division of Douglas Aircraft Company, much thought was given to the preparation of fastener holes in highly stressed areas. The aim of the design engineers was not only to strengthen the metal in the immediate vicinity of the hole by applying various work hardening techniques, but also to produce a fastener hole with an interior smooth enough to preclude the possibility of stress concentration points. It was also desired to produce these holes to the narrowest possible useable tolerance.

As a result of intensive thought and study, three new fastener hole preparation techniques, each used for the first time on the DC-8 airplane, were researched and perfected. Briefly, these techniques are: (1) coining a groove around the hole to cause some plastic metal deformation and thus cause work hardening of the metal and an increase in metal strength; (2) drilling holes undersize, then broaching them to secure the ultimate in hole tolerance along with a mirror-like interior surface finish; and (3) finishing holes, that can not be coined in thin material, by drilling them undersize, then expanding them to size by means of an expandable stainless steel bushing.

A description of these three new fastener hole preparation techniques follows.

COINING AROUND THE HOLE

As already noted, the prime purpose of coining is to cause some degree of plastic metal deformation or movement in the immediate area of the coined groove. This metal movement results in some work hardening of the metal, which in turn results in increased strength and better fatigue properties.

At the Long Beach Division, this coining operation is accomplished in the spar section for the DC-8 airplane, and applied around bolt and lock bolt holes in heavy panels in highly stressed areas. As the coined groove is formed around the fastener hole, the metal actually extrudes inward and reduces the diameter of the hole. Thus the degree of metal movement necessary to result in work hardening is obtained.

Due to the high operational stress to which the coined parts are eventually subjected, coining is considered a critical operation. Only trained and qualified personnel are permitted to perform the work. Coined groove depth is critical—if too shallow, the desired results will not be obtained; if too deep, cracking may result.

A four-legged coining depth gauge is used to measure and check groove depth. On material from .067 to .150 inch in thickness, groove depth must be .005 inch; on material from .150 to .250 inch, groove depth is .0075 inch; on material from .250 to .410 inch, groove depth is .012 inch.

As many of the components being coined are tapered in shape, spring type coining dies that will automatically adjust to the taper are being used. The dies are equipped with pilots which fit into the fastener hole around which the doughnut-shaped groove is being coined.

The fastener hole is initially drilled from 1/64 to 1/16 inch undersize. Even this initial undersize drilling must allow from .005 to .007 inch clearance for the coining die pilot so that it will still clear as the metal extrudes inward during the coining operation. The undersize holes also facilitate matching of the parts together after coining. After coining and matching, the fastener hole is then drilled to the correct size.

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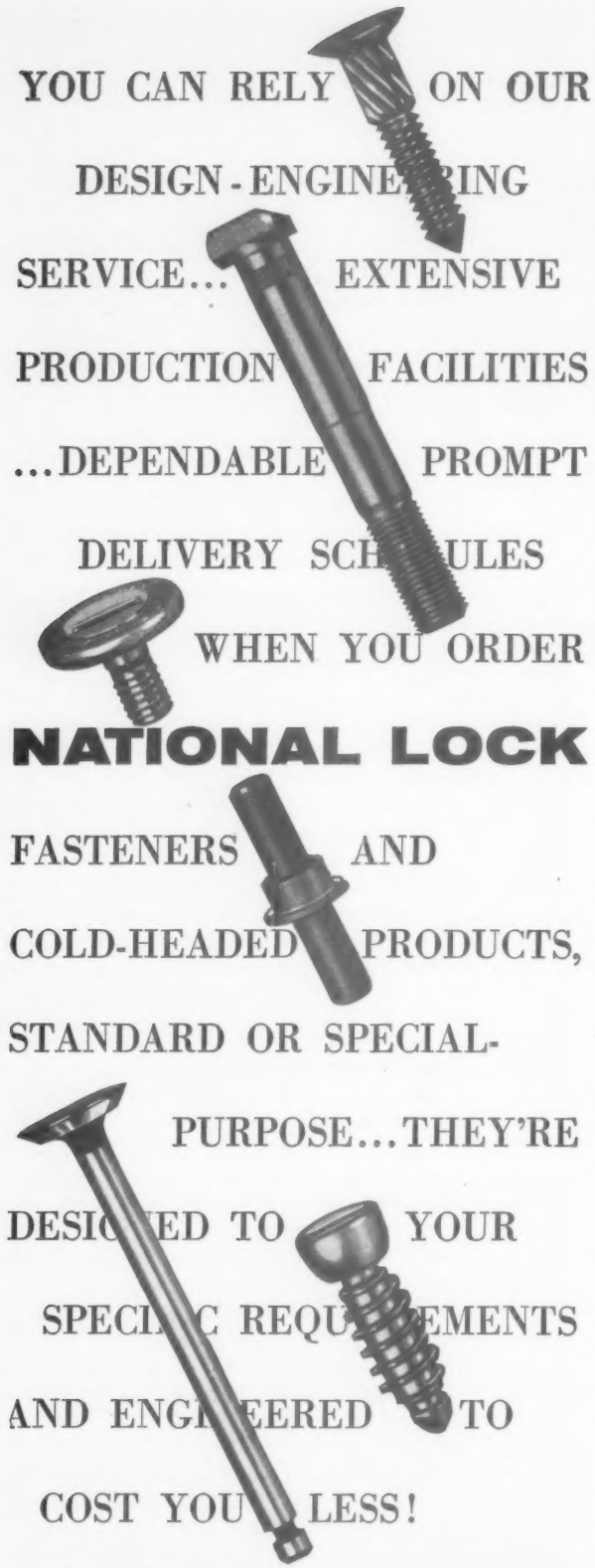

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Hole Preparation (broaching), continued

There is another application of coining on the DC-8 which has nothing to do with fastening. Integral wing fuel tanks are used in the big airplane. Fuel channels, approximately ¾ by 1 inch in size, are milled through the heavy wing structure components. A groove is coined around each fuel channel orifice. The increase of strength thus obtained minimizes the danger of fatigue cracking around the milled channels.

Broaching is used on highly stressed components where fastener hole tolerance and interior finish is critical. The broach leaves a mirror-like surface finish on the interior of the holes. Because the broach is actually "floated" through the hole—that is, the pressure is equal on all sides of the broach as it performs its cutting action—fastener hole centers can be held to within .0002-inch tolerance.

Two types of broaches are used—one-piece broaches where there is ample work room, and two-piece broaches where workroom is restricted. Hydraulically-powered broach pullers are used to accomplish the work. Here again two types of pullers are used—a straight broach puller where there is room to use it, and a 90 degree puller for use where headroom is restricted.

Each broach starts with a pilot for guiding it into the fastener hole and to which the broach puller is clamped. The pilot is followed by roughing teeth, then semi-finishing teeth, then finishing teeth. The octagon-shaped broach teeth each have lands, and every fifth land is critically aligned to assure broaching accuracy. The roughing teeth are ground to a 2 degree back angle, the semi-finishing teeth to a 1 degree back angle, and the finishing teeth to a ½ degree back angle.

Holes to be broached are pre-drilled .005 inch undersize. Even this pre-drilling is critical, and the undersize hole is usually prepared either by two pre-drills and a reamer, or a pre-drill, a core drill, then a reamer. Because of the small amount of metal removed in broaching, a relatively well finished hole must be available to start with.

While fastener hole broaching is a relatively expensive technique, both as to tooling and time involved, it is well worth the cost in specific phases of aircraft production where high stresses demand the utmost in fastener hole tolerance and resistance to fatigue. Approximately 2500 holes can be broached in aluminum before the broach must be resharpened. Proportionally fewer holes can be broached in steel before resharpening is required.

Hole expansion, as employed at Douglas, serves the same purpose as coining in that it work hardens the metal around the fastener hole, thus increasing its strength and bettering its fatigue properties. It is used mainly when there is a limit to the thinness of material which can be coined. On sheet stock below .067 inch thick, the pilots on the coining dies come together and prevent further closure. So the hole expansion technique is used on this thin material, or on combinations of several sheets

continued

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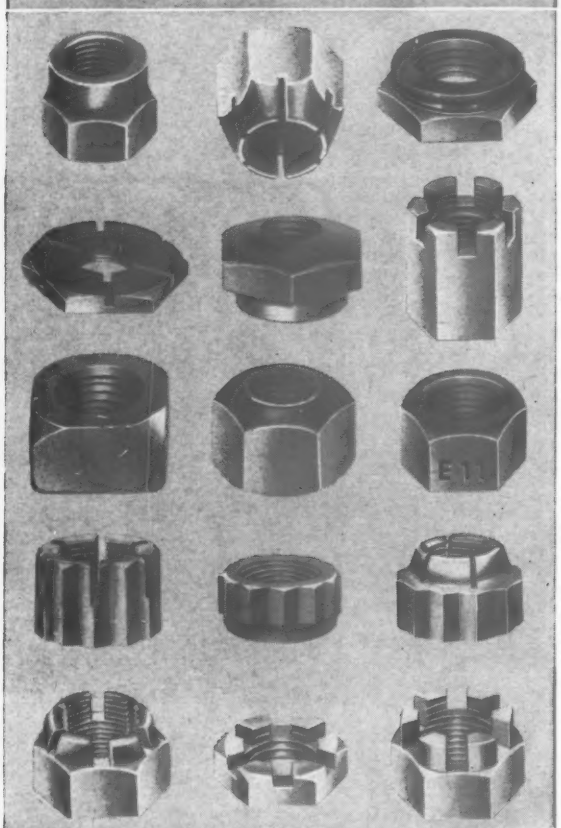

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Hole Preparation (expansion), continued

of thin material after it has been matched and is ready for fastening.

In hole expansion, a stainless steel bushing is placed in a pre-drilled, undersize hole, then a tapered pin is pulled through the bushing, expanding it and the hole with it to the desired size. The pre-drill is made to fit the bushing and is usually about .010 inch under the finished hole size. The stainless steel bushings used are manufactured for Douglas for this specific purpose. They would be available, of course, to others who wish to employ the hole expansion technique.

In performing the work, the undersize pilot hole is drilled as described above. The bushing is then inserted in the hole. Next, a tapered pin properly lubricated is inserted through the bushing. The end of this pin opposite the taper is serrated to facilitate gripping of the pin puller. Another protective bushing is then placed around the serrated end of the pin and against the material. The puller braces against this bushing during pulling and thus does not mar or scratch the base material around the fastener hole.

The jaws of the lock bolt gun used for pulling are then fitted into the pin serrations. The jaws release automatically when the gun is shut off at the end of each pulling cycle. About four cycles are necessary to pull the pin through the bushing. A special puller mounted on another lock bolt gun is then used to pull the stainless steel bushing from the expanded hole. The bushing, useable only once, is then discarded.

As might be expected, during hole expansion there is an extrusion of metal outward around both ends of the fastener hole. This extrusion is subsequently de-burred.

The interior of the fastener hole, after expansion, is smooth and minus any tool marks which might result in points of stress concentration.

These three new fastener hole preparation techniques now being employed at the Long Beach Division of Douglas are relatively expensive processes. But when the ultimate in fastener hole strength and fatigue resistance is required, the cost is quickly dissipated in the results obtained. •

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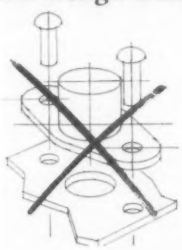

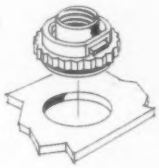

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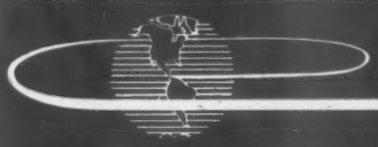

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by **Elliott Frank**, President
Flair Manufacturing Company
Brooklyn, New York

SOLDERING AND SILVER BRAZING VALVE PARTS

(Top) Valves are soft soldered and brazed. (Bottom) Burner acts as a miniature refractory-lined furnace with temperatures of 3000°F.

Soft-soldering and silver-brazing parts for small valves on a mass-production basis can involve some complicated problems which may affect both production rates and product quality.

At the Flair plant we recently solved several such problems in the production of air-venting valves and related heating accessories.

At first, when a sharp increase in demand taxed our production facilities beyond their capacity, we turned to induction heating. But this proved too slow for the brazing and soldering of non-ferrous metals; also, highly skilled workers were required for fixturing of work-pieces and operation of the equipment.

All-metal burners were tried next, but did not have the temperature control necessary for the different critical heating operations. In soft soldering bases to air-valve assemblies, occasional excess of heat would cause the internal parts of the valves to "explode." Also, the firing rate of each machine was affected by the turning on and off of other machines.

Difficulties such as these led to the use of five automatic Selas machines using special ceramic-lined burners. A combustion controller and accessory standard equipment were included in the new set-up.

Results were immediate. In the soft-soldering, the accuracy and uniformity of heat release overcame the rupturing-of-valves problem. Rejects dropped to below 0.5 percent.

The simplicity of the soft-soldering process is of special interest. The operations are performed by two automatic machines, with one unskilled operator at each machine. All the operator has to do is insert a 40% tin—60% lead pre-form ring into the base of each assembly, fit the air-valve into it, and set the workpiece in a fixture on a moving conveyor.

The workpieces are carried between two pairs of small burners (firing opposed), then between one pair of larger burners. All three pairs of the

By using automatic machines with ceramic-lined burners, Flair virtually eliminated rejects while speeding the joining of parts to small air valves.

Superheat burners are adjusted to low heat input and synchronized with the speed of the conveyor. They bring the workpieces near the critical temperature of 500°F, avoiding any excess of heat which would cause ruptures in the valves.

After passing between the burners, the air-valve assemblies are carried past a water spray, then automatically discharged into a dip basket. They are tested later for operating efficiency.

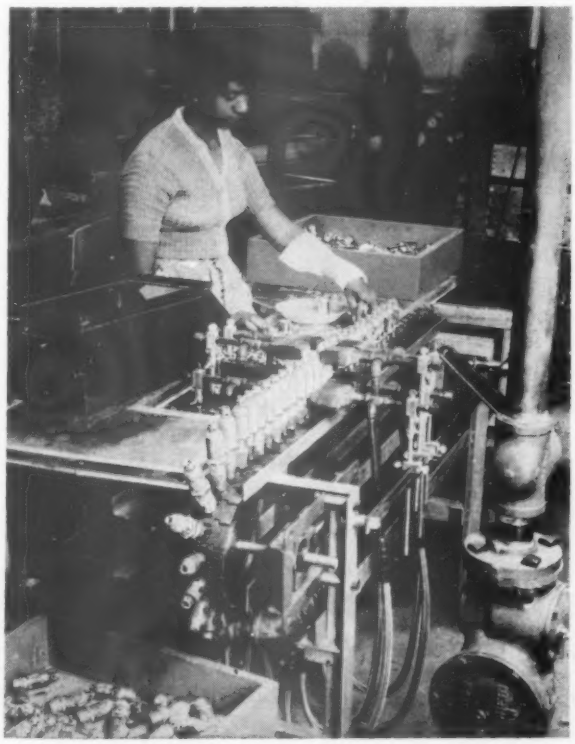
When changes are made from a load of one size valves to another in this soft-soldering operation, it is no longer necessary to add or take away burners to compensate for the more or less heat required. Each ceramic-lined burner can be adjusted to the new heat input rate required. With this elimination of stoppages, an uninterrupted production rate of 500 workpieces per hour is being realized on each of these two machines.

Silver-brazing operations are performed on three other Selas machines. One machine automatically silver-brazes a spud side-stem to a drawn shell at a rate of 600 workpieces per hour. Another machine brazes air-eliminating valves used in hot water heating systems. The unit automatically silver-brazes a heavy screw machine part to one end of the drawn shell of the valve, and a light screw machine part to the other end at the same time. Two pairs of larger burners fire opposed at the bottom of the valve; two pairs of smaller burners fire opposed at the top.

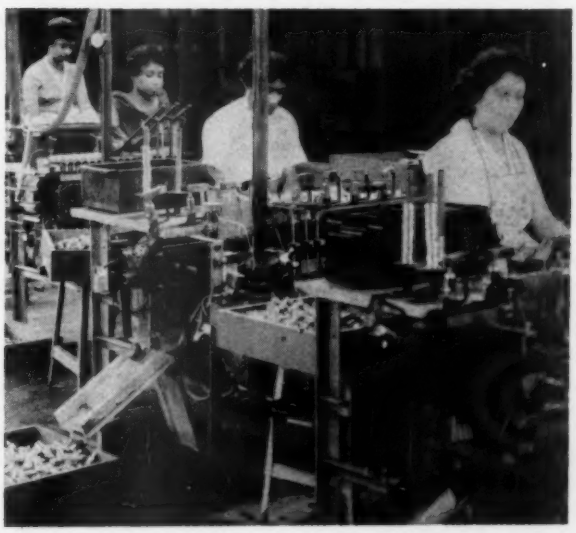
This brazing job calls not only for accurate control of heat input to synchronize the two separate brazing requirements, but accurate directing of heat to the two small localized areas. Both sections of the workpiece must be brought to 1400°F simultaneously in a few seconds. The quality of the job resulting is more than verified by the tests which show the sealed parts capable of withstanding 5000 psi pressure.

The simplicity of this brazing operation equals that of the previously mentioned soldering process. A single operator inserts pre-forms into the top and bottom sections of each valve, assembles the unit, and places it in a workholding fixture on a moving conveyor. After passing between the burners, the workpieces are air-cooled and automatically ejected into a dip basket. After brazing, the workpieces undergo bright dip operations before final assembly.

An outstanding economy achievement has been the virtual elimination of rejects and production of top quality, durable ware only . . . quality that has helped triple the size of Flair in the past six years. •



(Left) Unskilled operator assembles and loads valves while two pairs of burners at both top and bottom braze screw machine parts at either end simultaneously. (Bottom) Operators insert preformed rings, assemble and place workpieces in fixture. First two machines solder 500 valves per hour, two brazing machines, 600 valves per hour.



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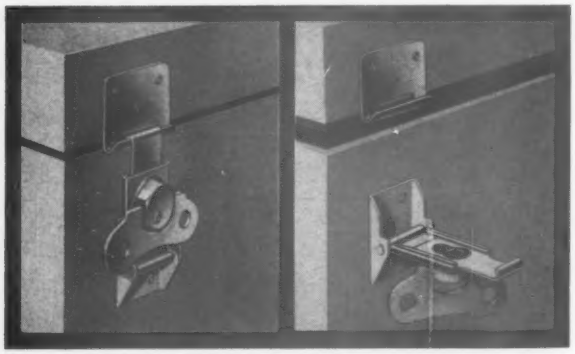

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FORCE GAGING OF ASSEMBLIES

Force is an important dimension in the proper operation of most manufactured products. Proper function of a mechanical or electrical product with moving parts is often based upon its ability to exert a certain force or the ability of one or more of its component parts to exert a certain force. If the product is a material, its ability to resist certain forces is likely to be an important measure of its quality. In addition, it is often important to know if assembled parts will hold together when subjected to a certain force.

In the past the precise measurement of force often required cumbersome weight-and-pulley systems or big expensive testers. As a result the test was either relegated to the laboratory or was not accurately performed at all. The inconvenience of testing production items with laboratory equipment is known to any production man who has had to rely on it.

However, today portable force gages capable of accurately measuring forces from a few grams up to several hundred pounds are available to make precise force measurements and simplify force gaging in both the lab and on the production line of assemblies and assembled parts. Whether hand-held, or mounted in simple test fixtures to simplify the performance of repetitive tests, these gages are speeding quality control operations in plants throughout industry to such an extent that they have gained the acceptance previously reserved only for dimensional gages.

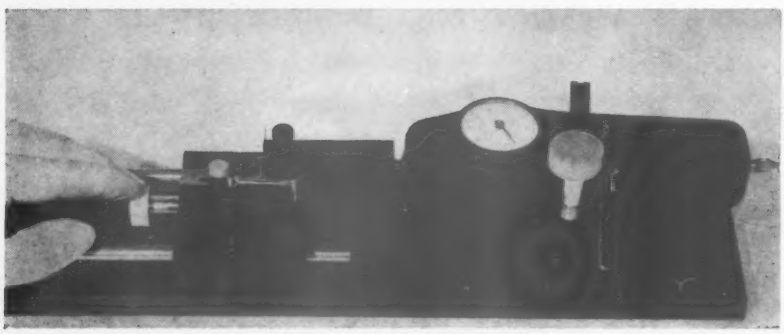
continued

Fit of a swivel pin joining two sewing machine parts is tested by force gage equipped with a stiletto and fitting and mounted in a simple rack-and-pinion fixture.

An aircraft manufacturer uses force gage to check and adjust artificial loads which must be built into boosted control systems. Here the force required to push the "stick" forward is being checked with a looped wire hooked to tension head on opposite end of gage.

A buzzer-equipped test fixture (below) sounds when plunger assembly has been compressed to specified length, measuring load.

Gage (above) used in tension tests the bond strength of printed circuit laminates. One-inch test strip of foil is attached to gage by clamp and chain.



Electric motor-generator brush springs are tested in a special fixture. End attachment on gage simulates carbon brush. Scale mounted on fixture shows deflection.

There are two basic types of precision force gages (discounting the calibrated-spring or "fish-scale" type used where accuracy is not critical): the compensated-spring type and the beam type. Each has its advantages and limitations and actual selection should be based upon the requirements of the application.

GAGE ACCURACY

The compensated-spring instrument measures force by deflecting a compression spring. Accuracy is maintained by making the spring of rectangular wire to insure the linearity of its force-deflection characteristic and preloading the spring with a specially matched extension spring for accurate calibration. Of course, all moving parts, including the gage dial, are designed to be virtually free of error-producing friction.

Beam-type instruments measure the deflection of a beam under load and translate it into a force reading with a dial indicator. Similar selective assembly techniques and friction-free design insure their accuracy.

IMPROVING QUALITY CONTROL

The accompanying photographs show how one type of these hand-held force gages has simplified production testing in a number of assembly plants. Within the range of their operation, these instruments have freed production men from reliance upon laboratory equipment for quality control operations, and have simplified many laboratory operations which previously required expensive testers or cumbersome weight and pulley arrangements. They have also made it possible for some manufacturers to make accurate tests which were previously considered impractical except by human judgment on a go or no-go basis. •

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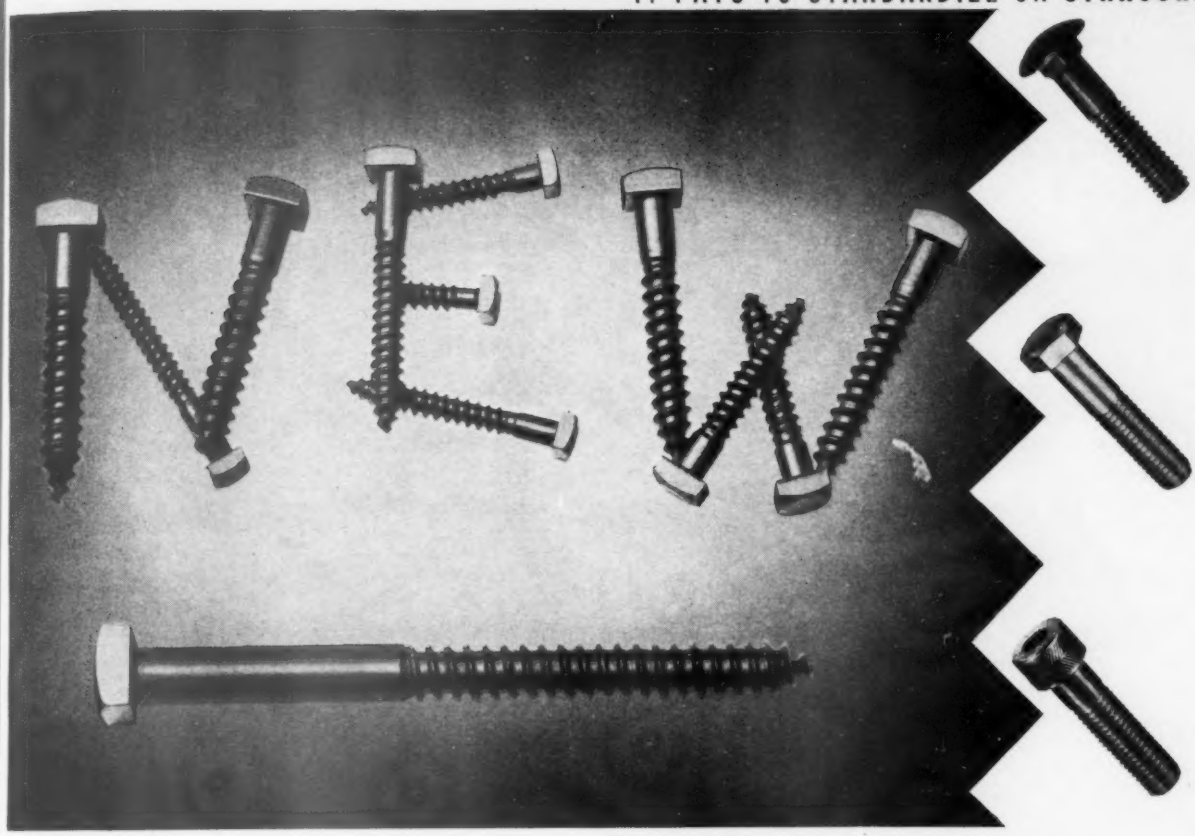

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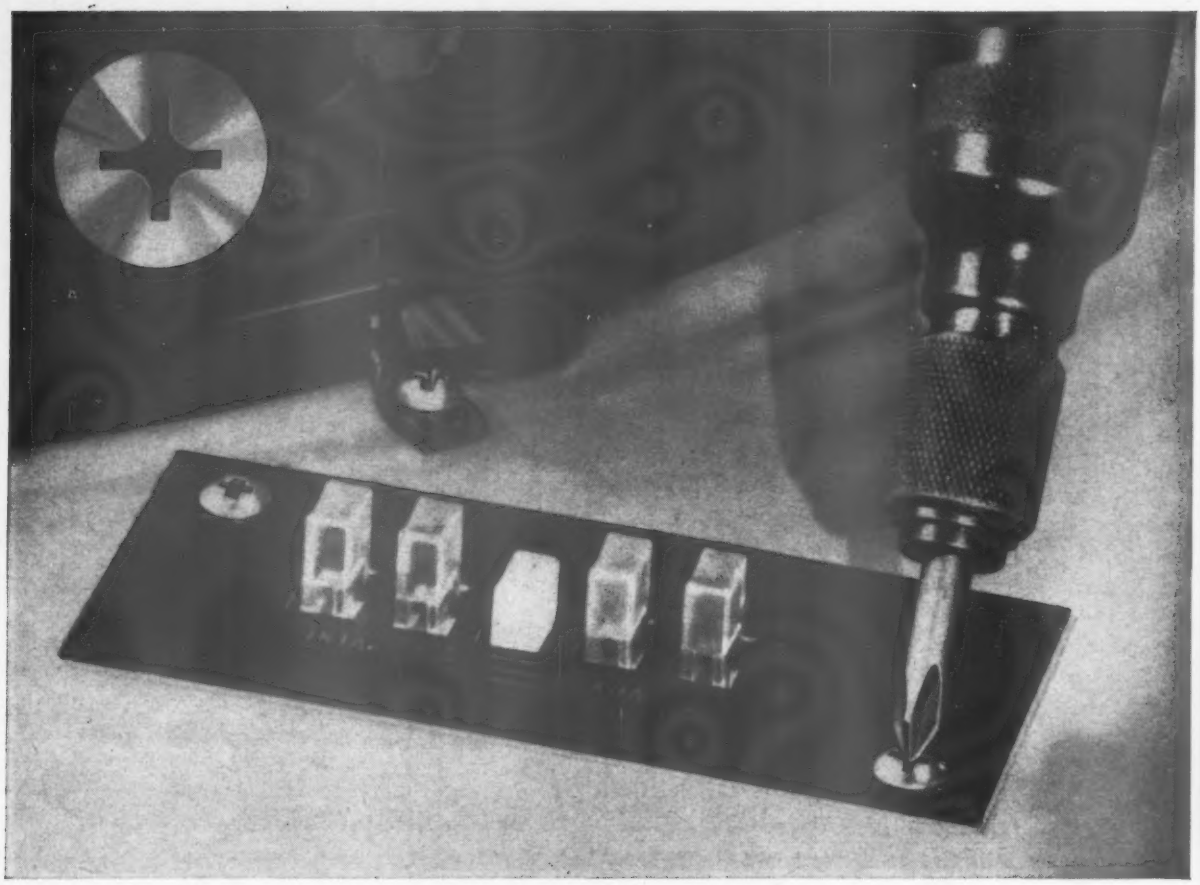

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Continuing Product Improvement (A few more of the design changes in Phillips screws)

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- The establishment of improved wing clearance between surfaces of recess and driver bit to favor best driveability.

improve appearance, permit design freedom

If product appearance is an important consideration to you, as it is in the design and assembly of most products, compare Phillips cross-recessed-head design with other types of fasteners.

With Phillips screws, because of the perfect alignment of the cross recess and driver, there's no danger of the driver slipping and marring surfaces . . . even with power drivers. Also there's no unsightly burring or splitting of screw heads.

There is no difficulty in driving Phillips screws in awkward positions. They may be located wherever design and appearance considerations dictate.

Improved appearance is only one reason for specifying high quality Phillips cross-recessed-head screws. Their ability to speed production, reduce costs and provide greater holding power accounts for the widespread usage of Phillips screws by so many manufacturers in every major industry.

Constant product improvements (see box) also benefits you. Phillips famed cross-recess is made in every type of head configuration to a universal standard by leading fastener producers in every section of the country. On your fastening jobs, specify Phillips screws. 02

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Use of special fixtures plus color coding of component parts facilitates the assembly of pistons

AUTOMATIC ASSEMBLY OF PISTONS

The assembly of rings, connecting rods and pins to pistons is a large scale and exacting operation in automotive plants. This is largely because the number of parts handled is great, they are diverse in size, have to be machined to close dimensional limits, and must make close fits with each other and with mating parts of the engines.

Good handling facilities are needed. Even though specialized assembly machines are used, a large number of people are required, adding to costs. Moreover, unless the job is done right, no end of trouble can result.

At the Oldsmobile plant in Lansing, Michigan, these problems have been pretty well licked. However, they necessitate much care in holding specified dimensional limits and in avoiding nicks that can cause a lot of trouble and make rejects run high. Nicking was not brought under satisfactory control until manual handling was greatly reduced. This was done by the use of many conveyors and by automatic loading and unloading of nearly all assembly machines.

It is necessary to do considerable selective assembly. Selection is simplified by automatic gaging and by grouping parts that fit each other into the same racks. These racks reach assembly points with all the parts properly paired and color-coded. This minimizes delay at assembly points.

continued

Operator places piston in a fixture that inserts rings in the ring grooves. The rings are fed automatically from stack back of the fixture. Each ring is expanded so that it will slip over the piston without damage, and enter the mating groove when in correct position.

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Selective Assembly for Pistons, continued

Racks holding pistons reach the first assembly machines in sets of eight. Here, the operator puts pins into a short chute or magazine. One rod and piston are placed in an indexing fixture that holds them so that holes for the piston pin come in line with the pin at the next indexing.

After the fixture has indexed, an air-operated plunger pushes the pin into correct position. Its ends are flush with slots for wire lock-rings. Piano wire from reels then feeds down automatically into each slot to form rings that are cut off and snapped into the grooves. The assembly is then placed on a rack hanging from an overhead conveyor. In the interval, another rod and piston are loaded ready for the next indexing. These operations are repeated until the whole set of eight is assembled and put back into a rack which is then advanced to the ring assembly fixture shown on preceding page.

Back of the inclined front plate and at right angles to it, there is one channel for each ring to be inserted. A stack of rings is set into each channel by hand; springs press the stacks forward. Inside the fixture is a rotary disc having recesses. The front ring from each stack is pushed into one of these recesses as indexing occurs. Just before each recess reaches the center of the fixture it holds three rings. Each ring is in a plane corresponding to the positions it is to occupy when applied to ring slots of the pistons.

When the three rings arrive at the center of the fixture, they are ready for insertion as soon as they are expanded enough for the upper end of the piston to pass through them. Expansion occurs automatically as the piston trips a trigger when placed in a guide and pushed inward manually. When the ring grooves are opposite the rings, the cam that holds them open retracts. The rings contract and enter the grooves, completing the assembly.

When the piston and rod assembly is removed, it is returned to the carrier. After the whole set has received rings, the carrier is advanced toward the engine assembly line. This ring setup operates automatically except for loading rings into stack holds and for placing the piston rod assemblies, one at a time, into the fixture. Buttons to the left of the operator can be used to control each function manually during setup, or whenever trouble arises.

Ring insertion fixtures are rapid and precise. They are designed to minimize nicking or other damage at ring slots or elsewhere. Such damage may interfere with subsequent assembly or with proper functioning in service or both. It is also important that rings work freely in the grooves.

As the racks have to dwell at the two assembly stations described, and at other duplicate stations, the conveyor that advances the carriers is of the power-and-free type. This permits each carrier to remain at a given station until the work required there is completed. Then the carrier is advanced to the engine assembly line. ●

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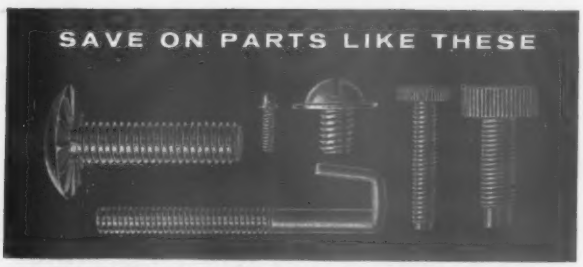

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WOODEN MOCKUPS SPEED COMPUTER PRODUCTION

The use of wooden mockups in pre-production planning has helped cut lead time on new equipment at the computer facilities of Librascope, Inc., of Glendale, California.

In order to reduce the lag between design and actual assembly of complex computer and data processing systems, industrial engineers at Librascope start mockup planning while a unit is in the final design stages. Particularly in defense equipment, where dimensions and configurations of cabinetry are specified in advance by the Services, preliminary mockups permit development of the most efficient assembly techniques.

Mockups follow in exact detail the exterior and interior dimensions and configurations of the computer equipment. Dummy sub-assemblies, meters and other integral components are also constructed of wood, and placed in the mockups to determine the most desirable arrangement from the standpoint of production and servicing. In the final phases of design, these sub-assemblies and other components are firmed up to a point where changes in shape or size will be only minor, permitting the use of wooden models for layout progress.

Assembler prepares cable harness on mockup board containing wooden dummy sub-assemblies and terminal blocks in relationship to final equipment configuration.

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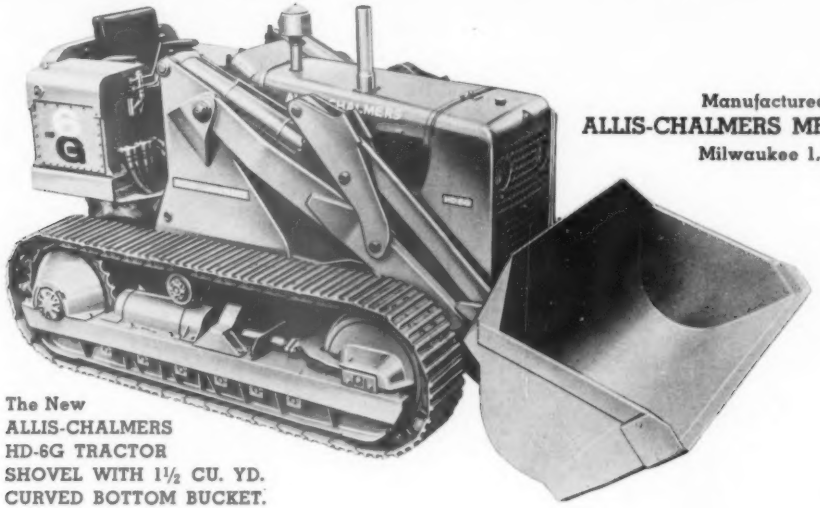

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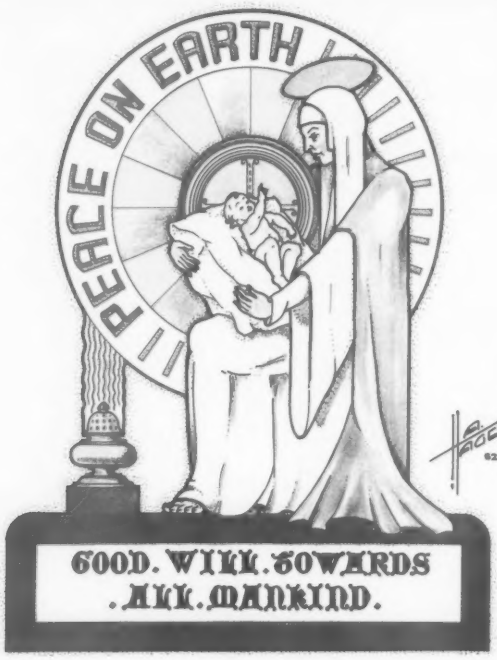

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May our Faith in the Future be manifested in a common effort toward Peace on Earth and Goodwill to All Men.

Merry Christmas and Happy New Year

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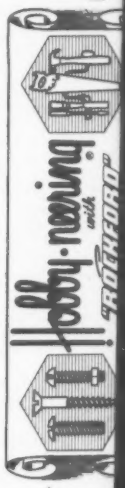

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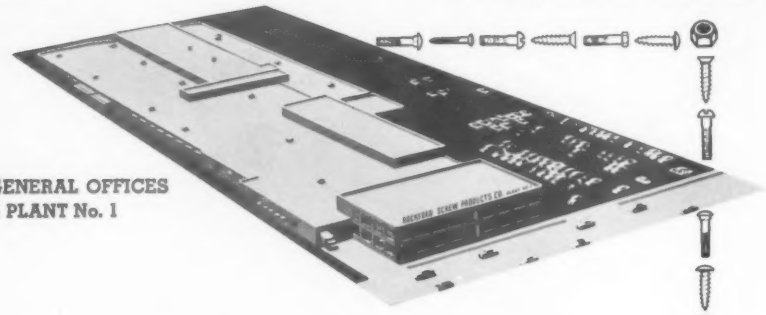

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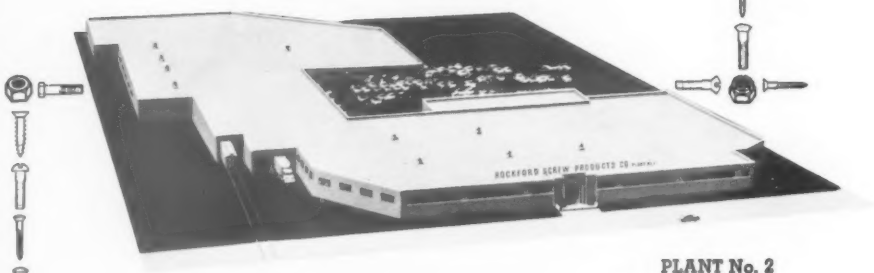

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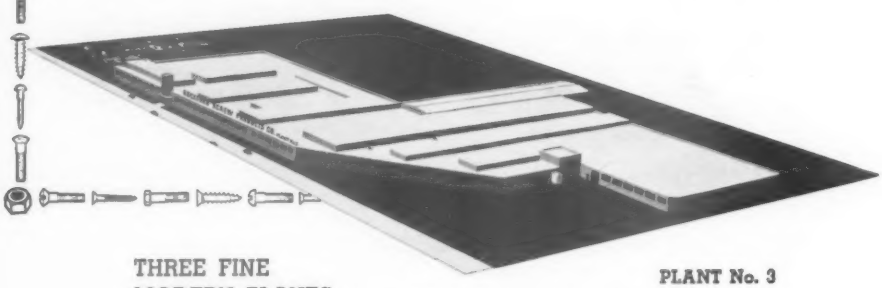

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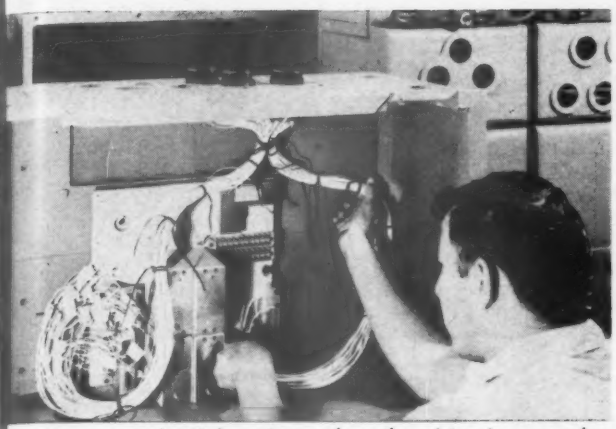

here an industrial engineer plans the wiring in a wooden mockup of Librascope computer equipment.

When a mockup is completely assembled, cabling is designed and provisions are made for special channels, clamps or other means to enable the wire to withstand the dynamic forces of their intended environment. Color coding is established, both as a assembly aid and as a help in future servicing.

After the cabling has been worked out, diagrams are turned over to the cabling department where special harness boards are prepared in advance of final asssembly. These boards also contain dummy assemblies and terminal blocks for exact measurement of wire length and harness configuration. Any number of harnesses can be prepared in advance.

At the same time, the industrial engineers plan the mounting, casting and production tooling necessary for assembly of the equipment. In some cases, a second stage mockup of actual rough metal castings will be hand-fitted and modified to determine the final shape suitable for the most efficient foundry and machine shop production. Rigidity, weight, strength, machinability and castability are worked out at this stage.

Use of the dummy equipment also permits Librascope engineers to establish the production line facilities needed for the equipment and to make arangements to set up special storage and handling equipment before production is scheduled. In the case of heavy units, this may include overhead cranes for final assembly lines, as well as special bench fixtures to hold major sub-assemblies during detail assembly stages.

The variety of equipment manufactured by Librascope requires highly detailed production planning. Production changeover from systems like the huge data processing centrals for the Federal Aviation Agency, to precision electro-optical equipment, requires major changes in assembly lines and workflow patterns.

The use of mockup planning at pre-production has cut the delay between final design and production by permitting quick changeover on the basis of preplanning with full-sized three-dimensional replicas. These savings in time and production cost are passed on to the customer, according to Ivan Franklin, Supervisor of Industrial Engineering in charge of mechanical production planning. •

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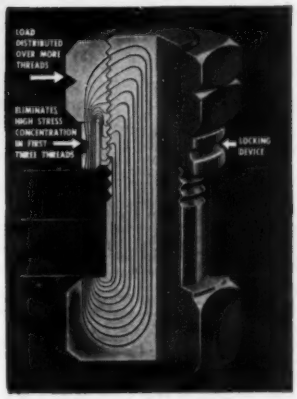

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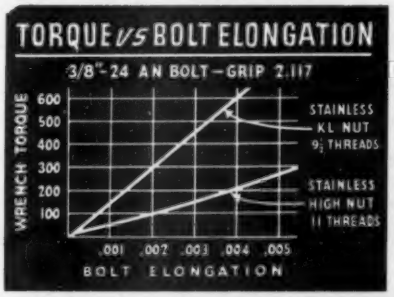

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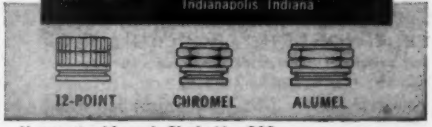

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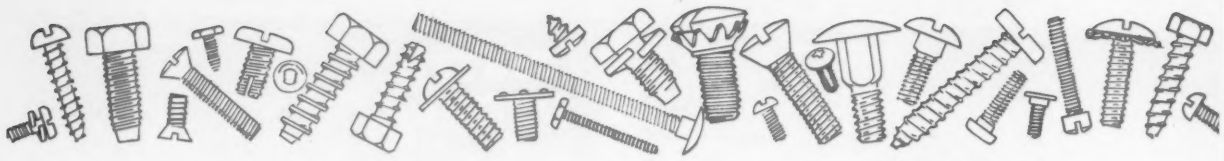

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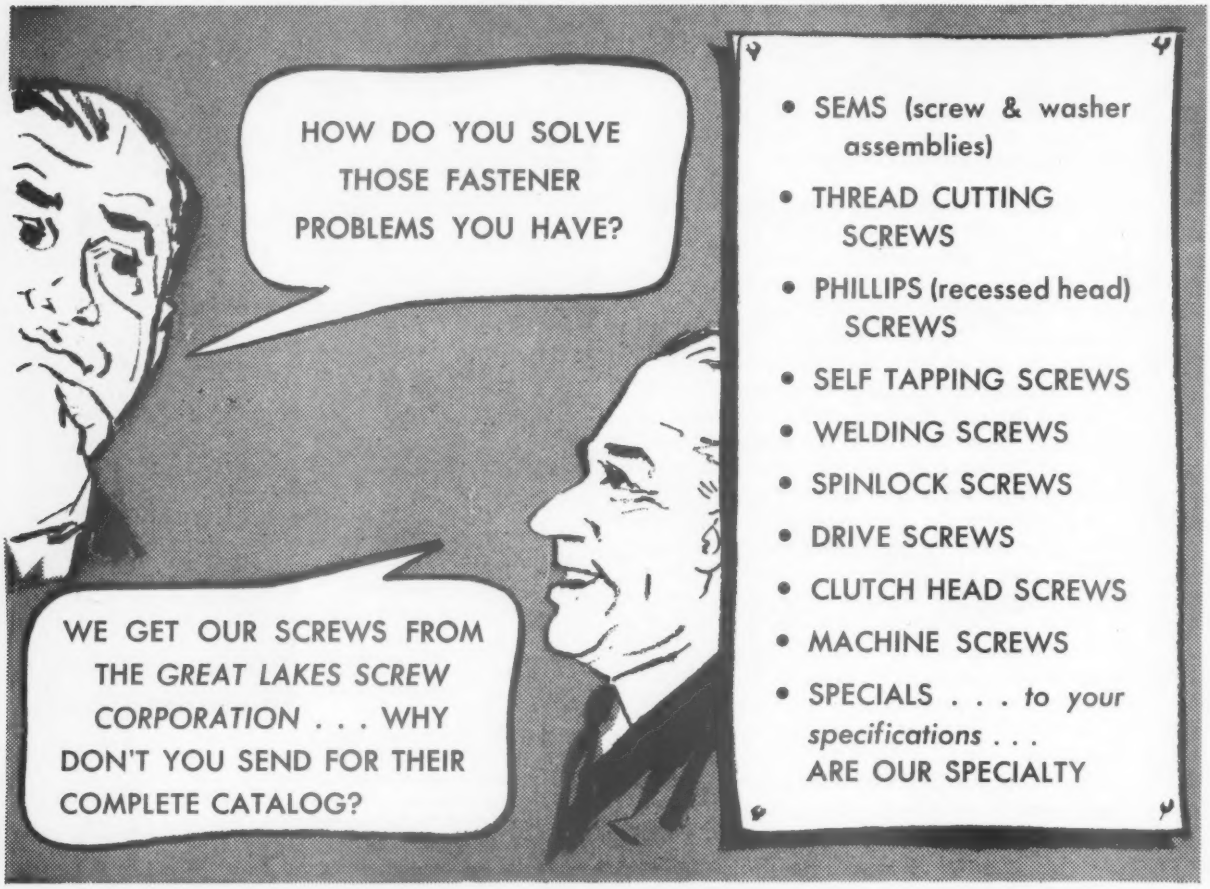
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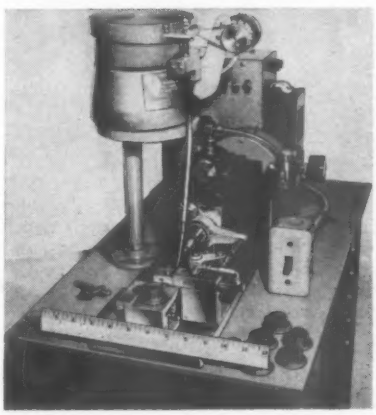

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ARBOR PRESS INCORPORATES STAKING FEATURE

An arbor press performs pressing or staking operations separately, or combines them in rapid sequence.

Finished assembly from primary components is often as fast as from pre-stocked sub-assemblies.

Staking is done by the impact of a tool steel piston rod inside the press ram, which acts as an air cylinder.

Force is adjustable by an air valve regulator, from 15 psi to line pressure. A series of light blows—for materials like nylon—are possible.

Cramer Controls Corp., Centerbrook, Connecticut.

Use postpaid card. Circle No. 1

ADHESIVE APPLICATOR FEEDS HAND BRUSH

A pressure-fed applicator feeds solvent adhesives through a hose to a brush where the operator has finger tip control over flow and shut-off. The applicator is designed for production work where solvent rubber adhesives are now being hand brushed. The portable tank operates on 20 lbs. factory air pressure and output pressure can be regulated to provide optimum adhesive flow for the thick or thin viscosity in use.

Each unit has multiple fittings to permit three operators to work from one tank. Various sizes of the lightweight aluminum brushes can be interchanged.

Bostik Dept., B. B. Chemical Co., 784 Memorial Drive, Cambridge, Mass.

Use postpaid card. Circle No. 2

AUTOMATIC TAPPER ASSURES CLEAN THREADS

Automatic tapping without tearing or stripping of threads or tap breakage is achieved through "controlled pitch" lead screw feed.

Designed for either portable or stationary applications, Tru-Thread Tapper Models 93B-00 and 93B-5 find use in production manufacturing, airframe manufacturing, construction and steel erection.

The positive pitch feature, with lead screw pitch identical to that of the tap, prevents thread-stripping or tearing and assures clean threads with a high degree of accuracy.

The two sizes available cover the range of hole sizes from No. 2 to 1" diameter, with a variety of speeds. The stroke is adjustable from a maximum of 1½" for the 93B-00, and 3" for the 93B-5, to a minimum of 3/16".

Gardner-Denver Co., Quincy, Ill.

Use postpaid card. Circle No. 3

CO_2 BUTTON WELDER FOR AUTOMATED ASSEMBLY

A button welding unit designed for high assembly speeds on automated lines joins steel from .035" to .250" thick. The Auto-Special CP C-O Manual was introduced at the recent Metals Show in Chicago.

Finished welds may have a reinforcing rivet head or flat appearance as the application demands.

Basic equipment is a 600-amp. power source with slope control, Stellarweld reactor, wire drive and semi-automatic gun. No special operator skill is required.

Welding Products Div., A. O. Smith Corp., 3533 27th St., Milwaukee, Wis.

Use postpaid card. Circle No. 4

COMPACT HOPPER FEED FOR SET SCREW INSERTION

Set screw insertion rates with a hopper feeder are reportedly four times faster than manual methods.

Design changes include a reduction in vibrator and air-operated driving mechanism size, more accessible controls and wiring. Efficiency is gained as rejection rates have been reduced close to zero.

Set Screw and Mfg. Co., Bartlett, Ill.

Use postpaid card. Circle No. 5

ZINC SOLDERING PROCESS FOR JOINING ALUMINUM

A zinc soldering process for joining aluminum to itself and other metals today is expected to broaden the light metal's use in the refrigeration, automotive, air conditioning, and electrical industries.

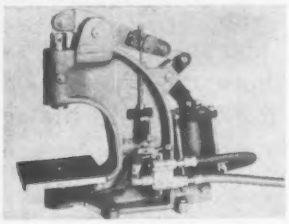
The basic technique is not new—in fact, is the oldest means known for joining aluminum. But Alcoa research

engineers found the process especially suited to bonding thin complex sections, including heat exchangers of all types. Other promising applications include metallurgical bonding of spirally wrapped aluminum, plate fins to aluminum, copper or steel tube, and bonding socketed tube joints and dissimilar metal transition joints.

Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

Use postpaid card. Circle No. 6

BENCH PRESS-RIVETER HAS MANY ASSEMBLY USES



Using shop air, the Bench Press-Riveter combines the toggle action of triple-lever design with a cushioning action to deliver greater working power with less shock.

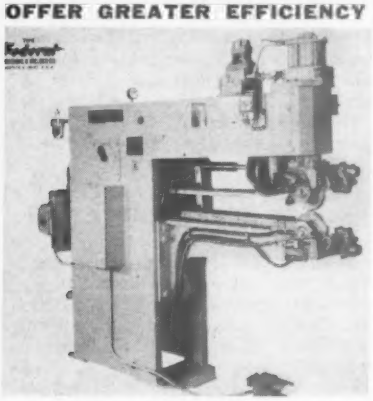
It delivers two tons of driving force with 100 psi shop air.

The unit has a 15/16" stroke, a 4" throat and operates at 200 strokes per minute. It weighs 58 lbs. and requires one house for operation. The riveter can be adapted for many industrial uses: assembly, swaging, crimping, punching, marking, trimming, broaching, flaring, pelleting.

Trio Machine & Mfg. Co., 35690 Vine St., Willoughby, Ohio.

Use postpaid card. Circle No. 7

STANDARD SEAM WELDERS OFFER GREATER EFFICIENCY



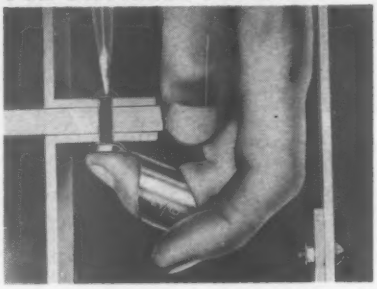
Standard seam welders are made in three sizes ranging from 50 to 400 kva. Each size is available as a circular, longitudinal or universal machine in a range of standard throat depths and transformer sizes.

Some of the new features are: One piece trim-line frame, more compact, greater working area, new anti-friction slide, adjustable for wear or takeup, new longer arm and transformer design.

The Federal Machine and Welder Co., Warren, Ohio.

Use postpaid card. Circle No. 8

FINGER WRENCH HANDY FOR DIFFICULT ASSEMBLY



A Finger-Tip Wrench allows the user to reach into remote or hidden working areas to touch and hold a nut or bolt in a true fixed position for assembly or disassembly.

The tool was developed to solve the problem of trying to hold a nut with the fingers.

The wrench is worn like a ring on the finger without restricting free motion of the hands or fingers. Adjustable to fit different size fingers, the wrenches are supplied in the more popular head nut sizes.

Beaver Tool Co., Box 256, Huntington Station, New York.

Use postpaid card. Circle No. 9

DRIVING FASTENERS WITH A PORTABLE DRILL

Screws and nuts can be driven using a standard ¼" portable drill. A speed reducer provides seven-fold increase in torque.

The Versamatic attachment is finger-tip controlled. Action is stopped by releasing grip on the attachable unit. Fasteners can be "walked" into position.

The complete kit includes three sizes of screwdriver bits, three Phillips bits and ¼" and ⅜" square driver adapters. All bits are of the yankee-type.

Supreme Products Corp., 2222 S. Calumet Ave., Chicago 16, Ill.

Use postpaid card. Circle No. 10

PNEUMATIC POWER TOOL FOR WING-TYPE FASTENER

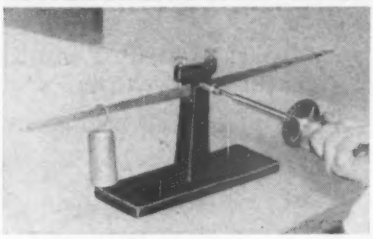
A pneumatic speed torque driver applies and removes wing nut type Kleko fasteners at a speed comparable to plunger type clamps without damage to work or fastener. The adjustable clutch allows presetting for exact torque and uniform clamping tension for pressures ranging from 0 lbs. to more than 600 lbs., automatically disengages when preset value is reached.

Hazards of "swirl" marks on work surfaces contacted by the fastener body or face is said to be eliminated. An indexing feature prevents "corkscrewing" or twisting of clamp needles, thus extending fastener life.

Monogram Precision Industries, Inc., 8537 Higuera St., Culver City, Calif.

Use postpaid card. Circle No. 11

DEAD WEIGHT BEAM TORQUE TESTER CHECKS CALIBRATION



A table size unit for checking calibration of various torque tools from 3 in.-oz. to 150 ft.-lbs. tests by using dead weight.

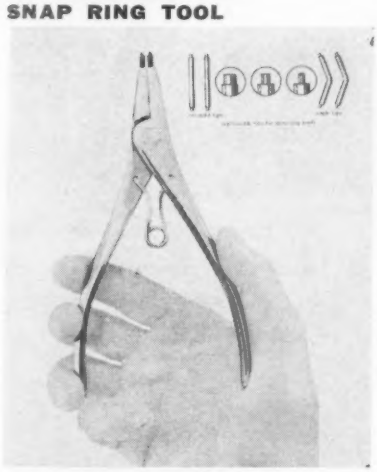
The 5½ lb. Dead Weight Beam Torque Tester has a 24" long aluminum balancing beam, pivoted at the center, and graduated in increments of 1". A removable square adapter fits tools with ¼" or ⅜" drives. Friction in the unit is virtually eliminated through ball bearing pillow blocks.

Standard avoirdupois weights can be used for testing.

Apco Mossberg Co., 1008 Lamb St., Attleboro, Massachusetts.

Use postpaid card. Circle No. 12

REPLACEABLE TIP SNAP RING TOOL



A snap ring tool features replaceable straight and angle tips of various sizes. Where engineering changes in snap ring sizes are made, the same tool can be used by changing tips. By the same token, when tips break or become worn, just reverse or replace the double-end tips.

Milbar Corp., 1900 Euclid Ave., Cleveland 15, Ohio.

Use postpaid card. Circle No. 13

AIR ATTACHMENT SPEEDS BLIND RIVET TRIMMING

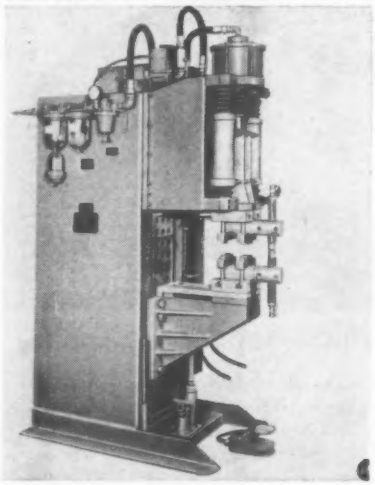
A blind rivet trimmer attachment, for use with Dotco Model 1AE right-angle drive air tools has a large guide surface assuring that the circular saw cutter is properly positioned and maintained in the correct cutting attitude. The attachment is moved over the work surface in the same manner as a flat-iron, reducing trimming time and also reducing the possibility of loosening the rivet and marring the surrounding surface. Also the rivet stem is trimmed square, which saves time in the subsequent shaving operation.

The rivet trimmer attachment can be used on universal type or countersunk type rivets, or on other similar types of fasteners.

Doeden Tool Corp., Sherwood, Ohio.

Use postpaid card. Circle No. 14

SINGLE-PHASE, 150-KVA PROJECTION WELDER



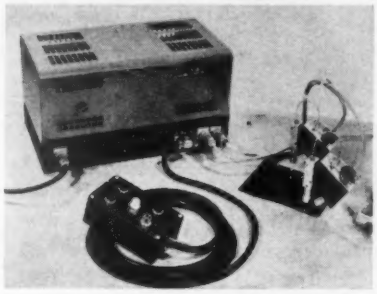
A 150 kva single-phase projection welder has a special Heat-Vector device for the automatic control of the up and down slope of the welding current, and provides the exact heat cycle needed to produce the strongest type of welds.

Non-binding, non-inhibited ram performance and instant follow-up in controlling weld properties are among other features of the PAS-150, which is equipped with light-metal rams, and a new lineal ball bearing sleeve. Need for replacing or regrinding the ram has been eliminated, as the design provides that a new wearing surface can be obtained as needed by a slight turn of the shaft in the ball bearing sleeves housing. Controls may be readily added for fully automatic operation.

Universal Electroweld Division, Electric Arc, Inc., 152-1 Jelliff Ave., Newark 8, New Jersey.

Use postpaid card. Circle No. 15

DUAL REGISTRATION SYSTEM CUTS ASSEMBLY REJECTS



In high-speed automatic assembly operations where two sets of registration marks must be aligned, a dual registration control system makes it possible to align two or more sets of variables where no reference point exists.

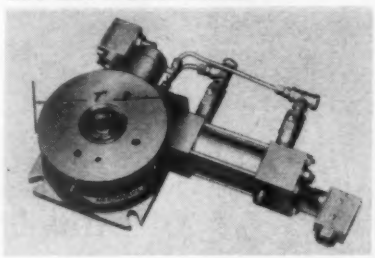
It is expected to sharply reduce spoilage losses, while increasing production.

The logic system is able to make decisions with millionths of a second. It is also designed for tension control applications.

Sterns Control Corp., Great Neck, New York.

Use postpaid card. Circle No. 16

INDEX TABLE (7") HANDLES 100 LB. WORK LOAD



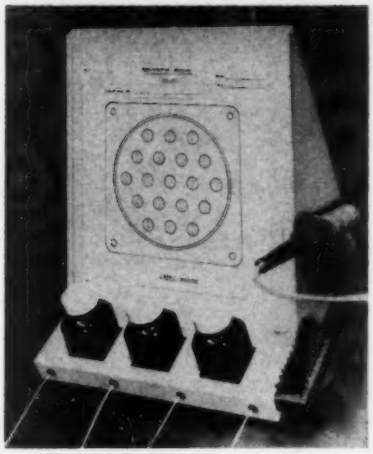
A heavy duty, 7" index table will make up to 75 indexes per minute and will handle a maximum work load of 1000 pounds. The maximum power stroke is three times line pressure; 4, 6, 8 or 12 stations are standard but any number up to 24 can be ordered.

To prevent overriding, the indexing cylinder is controlled on the forward stroke by a positive non-adjustable stop rod with an adjustable stop on the return stroke. To lock the table in position, (plus or minus .0015"), an additional air cylinder is mounted on the table's centerline.

Air Hydraulics, Inc., 608 Hupp Ave., Jackson, Michigan.

Use postpaid card. Circle No. 17

SOLDERING SERVICES COMBINED IN ONE UNIT



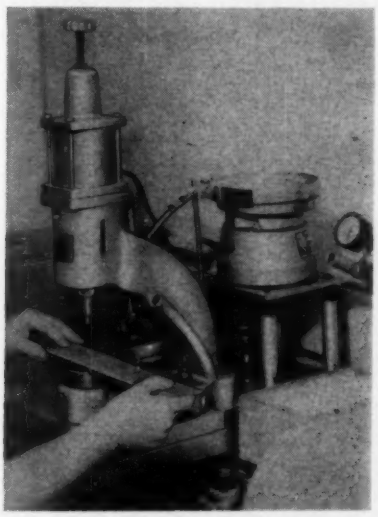
Solder Serv-O-Center combines all assembly and soldering services into one workplace.

It consists of a soldering iron holder which maintains proper iron temperature; an inclined holder for diagrams, blue prints; two mandrels for loading up to four 5-lb. reels of solder and lacing cord; three solvent and flux bottles; an iron cleaner.

Claude Michael, Inc., 703 W. Ivy St., Glendale, California.

Use postpaid card. Circle No. 18

MACHINE STAKES TERMINALS IN PERFORATED PANELS



A vibratory-feed staking machine positions and stakes up to 115 solder terminals per minute in perforated panels—approximately 15 times faster than single-stage, hand operated equipment. It permits accurate lugging of flat panels with throat lengths of 3" or under at high production rates.

A non-jamming feed mechanism delivers parts to pre-determined location cycle after cycle. Constant peening results are assured by a impact velocity control knob. The new staker is

designed for bench operation at 115 VAC and is easily portable.

Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.

Use postpaid card. Circle No. 19

100-WATT SOLDERING UNIT BUILT FOR HEAVY DUTY

A 100-watt input soldering unit is built for heavy duty. The Model 3374 provides selectable temperature from 500°F to 750°F.

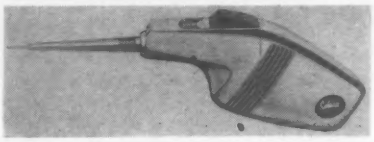
The unit has a pre-tinned iron-clad soldering tip weighing less than 4½ oz. and measures 1⅞" long.

Features include negligible temperature gradient between work, a sensing device and heat source.

Eder Engineering Co., Inc., 1568 S. First St., Milwaukee 4, Wis.

Use postpaid card. Circle No. 20

PROBE-TIP TOOL EASES WIRE SOLDER DISPENSING



Hand ejector-feeding of wire solder is simplified with a tool which dispenses just the proper amount of solder by means of finger-tip operated knurled control.

A probe tip provides needed backup pressure at the point of application. Solder wire also can be retracted with the control. Straight and angle-form probes in various lengths and radii are available.

Reloading is accomplished by removing a detachable cover.

International Electronic Research Corp., 145 W. Magnolia Blvd., Burbank, California.

Use postpaid card. Circle No. 21

PNEUMATIC WIRE STITCHER OF SMALL, COMPACT DESIGN

An air actuated wire stitcher forms a compact unit that can be used in many types of automatic equipment, or for manual stitching or tacking on a continuous or non-repeat basis. Size of wire it accommodates is from No. 27 to No. 25 round and 21 by 25 flat wire.

Easily mounted, the Model L Champion can be used in multiples to stitch one object with several stitches at one time. It may also be grouped for various patterns of fastening as required. It can be positioned to stitch downward or upward, horizontally or at any angle.

Acme Steel Co., 135th St. & Perry Ave., Chicago 27, Illinois.

Use postpaid card. Circle No. 22

BLANK INSERT SYSTEM SPEEDS INDUCTION HEATING

Operator time need not be lost in changing and adjusting a complete work coil assembly now that the Master Coil Set comes complete with the desired number of blank inserts to meet requirements established for the Model 150, 2 kw output Ther-Monic induction heating generator.

Sets are available for all electronic generators and come in two sizes. The small master coil has an I.D. of 2". The complete line of inserts is avail-

New Flip-Loc Fastener

WORLD'S FASTEST LINE CLAMP

Cuts Costs TO 80%

- Distortion-free
- Self-aligning
- High strength
- Self-contained

SAVES YOU TIME AND MONEY IN THESE WAYS

1. Cuts installation time
2. Cuts maintenance and inspection time
3. Cuts costly clamp replacement
4. Offers extra strength for heavier loads

The FLIP-LOC is a brand new TA exclusive. It is a completely self-contained fastener. You can open and close it quickly with just one hand. Integrated hinge makes the clamp stress-free, trouble-free, and simple to use. Made of 321 stainless steel, the Flip-Loc is available in your choice of insulator cushion liners: Neoprene rubber (general purpose), AW (aromatic fuel and weather resistant), and corrugated stainless (extreme high temperature). The Flip-Loc is available in sizes from ¼ to 6" in diameter.

Write for free literature which describes the new TA Flip-Loc in detail.

That's all there is to it!

Write for free Engineering Design Manual, Bulletin 210G (94 pages) shows hundreds of standard clamps for almost any harnessing application.

TA Mfg. Corp.
4607 Alger Street • Los Angeles 39, Calif.
(or call CH 5-3748)
TWX 9863 Glendale, Calif. • WUX CAT Los Angeles, Calif.

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With ONE Micro-Set Torque Tool!

Apco Mossberg's improved Micro-Set Torque Tool does both . . . torques left *and* right. Simple to set and stays set at 5 to 150 inch-pounds of torque. Releases Automatically at desired tension . . . and resets itself.

Compact and Versatile, Micro-Set is ideal for rapid precision assembly of electrical and industrial equipment, instrumentation — all close quarter tightening.

Several Sizes Available: 5 to 150 inch-pounds, 100 to 750 inch-pounds, 700 to 1600 inch-pounds, and a preset Midget type wrench for torquing in inch-ounces. Write today!

APCO MOSSBERG COMPANY
215 Lamb Street, Attleboro, Mass.

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Not a New Missile

it's a special fastener

It looks like it's ready to blast-off from Cape Canaveral. But see the threads? They give it away for what it really is—a fastener. And a very special kind, made by Bethlehem.

Our customer uses this special fastener as the point in a grip hook for steam log loaders. It's got to be strong and hard and tough. That's why we hot-forge it from a special alloy steel and heat-treat it. Other manufacturing operations: trimming, descaling, threading.

Forgings, bolts, nuts, rods, stampings—Bethlehem makes every kind of steel fastener specialty. Headed, threaded, pointed, bent, or slotted. Machined, punched, or drilled.

The nearest Bethlehem sales office will give you full details. Or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

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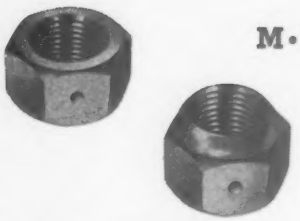
M·F "off the shelf"

line of lock nuts and weld nuts in all sizes NOW INCLUDES the AMAZING MF *Whiz-lock*



M·F TWO-WAY® LOCK NUT

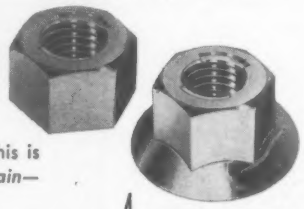
for faster application with consistent torque

This all-metal double chamfered, re-usable prevailing torque lock nut can be applied to bolt threads from either end. The center locking principle permits bolt end to be flush with top of nut. Can be reapplied up to 10 times.

M·F UNI-TORQUE® LOCK NUT

for high torque consistency in full and jam thickness

This *prevailing-torque* lock nut will withstand terrific vibration and shock loading; retains its locking ability for as many as 10 RE-applications. This is the lock nut that enables you to predict—*and maintain*—UNIFORM bolt tension.



The amazing Whiz-Lock . . . based on an entirely new concept, delivers *MORE* locking power, *MORE* bolt tension with *LESS* torque. Locks onto the work, *close* to the hole. *COSTS NO MORE!* This revolutionary design can be produced on our special machines at no increased cost. A far superior lock nut. Heat treated, high tensile strength, burr-free—very high re-usability.

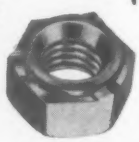
NEW! THE M·F *Whiz-lock*

free spinning—handles like a common nut!

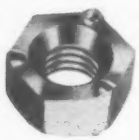
M·F PROJECTION WELD NUT

for low cost assembly

Solve production delays, cut manufacturing costs—fuse nut to the product in exact location. Engineered for assembly simplification. Available with the patented M-F Two-Way locking feature.



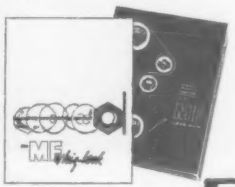
Pilot type



Recessed type

BROCHURES AVAILABLE:

The M-F Products Catalog—valuable data on torque and bolt tension. The Whiz-Lock Brochure.



patents pending

MACLEAN-FOGG LOCK NUT CO

5535 North Wolcott Avenue
Chicago 40, ED 4-8420

Offices in Principal Cities

Use postpaid card. Circle No. 243

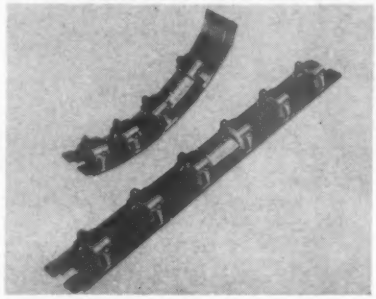
able pre-drilled with openings from ¼" I.D. to 1⅜" I.D., in ⅛" steps. Thicknesses are ⅛", ¼" and ½".

Single turn construction of the master coil offers lowest coil voltage and eliminates breakdown caused by brazing fluxes or other foreign matter that may build up on the coil. Work holding fixtures need not be insulated from ground; little or no arcing can take place because of the low operating voltages.

Dept. PR-6, Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N.Y.

Use postpaid card. Circle No. 23

PERMANENT MAGNETIC RAILS LIFT PARTS AT ALL INCLINES



A non-electric, permanent magnetic rail for elevating ferrous parts at previously impossible angles are available in four standard strengths—20, 46, 79, and 90 ounce. They are manufactured in bolt together sections so that any rail length can be obtained. Curved sections are also available.

Flat parts can now be elevated at a 90° angle to the floor. Flat parts, cans and some shapes can even be conveyed on the lower side of conveyor belts equipped with magnetic rails.

Bosworth Mfg. Co., 34250 Mills Rd., Avon, Ohio.

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VERSATILE WRENCH DOUBLES AS A SCREWDRIVER

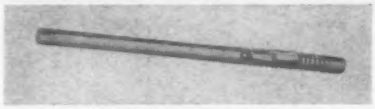
Plierench, multi-purpose pocket tool, features a unique geared transmission for extra-gripping power. With only the slightest pressure on its handle, the wrench will hold even a greased ball-bearing so firmly in its jaws that a 150 pound weight can be safely suspended from it.

It duplicates plier action, cuts heavy barbed wire, locks as a vise or clamp, acts as a hacksaw handle and acts similarly to seven different kinds and sizes of screwdrivers. The parallel jaws open up to 3" outer diameter.

Plierench, Inc., 4611 N. Ravenswood, Chicago, Illinois.

Use postpaid card. Circle No. 25

INSULATED POCKET MAGNET RETRIEVES ELUSIVE PARTS

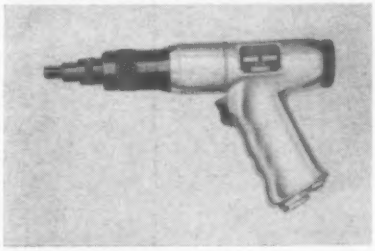


A pocket magnet that finds and retrieves elusive nuts, bolts, pins, washers, clips and other small items is made of insulating polypropyplene. Featuring a Alnico V magnet with chromium plated end, the No. 9 Magimmick is unaffected by oil or gasoline, virtually unbreakable, and comes equipped with pocket clip.

Ullman Devices Corp., Ridgefield, Connecticut.

Use postpaid card. Circle No. 26

PISTOL-TYPE NUTSETTER IS PNEUMATIC, NON-REVERSIBLE



Model 400 non-reversible pneumatic nutsetter is available with a choice of an adjustable clutch, positive clutch or direct drive—in any of four different operating speeds.

Designed as a straight type with a lever throttle, it is equipped with a pistol-type grip and trigger throttle. The tool is recommended for limited-space applications. Thumb rest handles are optional.

Airetool Mfg. Co., 328 S. Center St., Springfield, Ohio.

Use postpaid card. Circle No. 27

TOOL STEEL CUTTERS REMOVE RUSTED NUTS

Tools for quick removal of rusted or frozen nuts are packaged in kit form.

The Nut Buster set includes two tool steel cutters which split nuts without damaging bolt or threads. The cutter will split up to 100 nuts without resharpening.

Borroughs Tool & Equipment Corp., 2429 N. Burdick St., Kalamazoo, Mich.

Use postpaid card. Circle No. 28

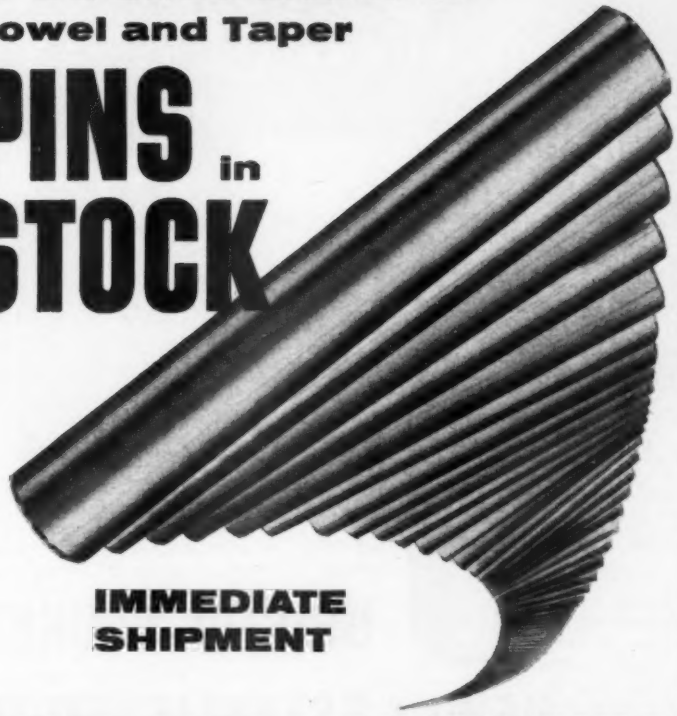
Endless quantities of

STAINLESS

Dowel and Taper

PINS in STOCK

Precision to:
+.0002
−.0000



IMMEDIATE SHIPMENT

DOWEL PINS

Precision Tolerance

- Stainless steel 18-8, type 303
- Diams: .0312 through .500
- Lengths: 3/32″ through 2½″
- Chamfered ends

TAPER PINS

Commercial, Precision and AN

- Stainless steel 18-8, type 303 Also many in type 316 (Commercial tolerance)
- Size: 9/0 through 10 in stock
- Lengths: 3/16″ through 8″ (Not all lengths in all sizes)

- "Specials" manufactured promptly. Large variety of raw material, on hand, for fast service.

PLUS all types and sizes of screws (slotted, Phillips—both magnetic and non-magnetic—hex, socket), bolts, nuts, washers, rivets, nails, keys, etc.

Phone or write for prompt quotation or shipment. Ask for complete catalog.

ALLMETAL®

SCREW PRODUCTS COMPANY, INC.

Manufacturers of stainless steel fasteners since 1929

821 Stewart Ave., Garden City, L.I., N.Y. Phone: Pioneer 1-1200, TWX GCY603

Midwest Division — 6424 West Belmont Avenue, Chicago 34, Illinois
Phone: AVenue 2-3232 — TWX CG 3185

West Coast Division—Warehouse & Office
5822 West Washington Boulevard, Culver City, California
Phone: WEbster 3-9595 — TWX: LA 1472

Use postpaid card. Circle No. 244

BRISTOL SOCKET CAP SCREWS MEET NEWLY ESTABLISHED INDUSTRY STANDARDS

Have higher strength, greater holding power than ever.

Bristol socket cap screws are now available to meet *all* the recommendations of the Socket Screw Manufacturers' Committee standards.

These new standards which increase the head diameter of socket head cap screws to 1½ times the body diameter—plus Bristol's advanced manufacturing techniques and stringently applied quality-control methods—are setting a new high for socket screw performance. Check these design advantages:

- Greater bearing surface under the head because of increased head diameter—for maximum holding ability.
- Less need for washers, less indenting of metal under the head.
- Greater holding power under shock and vibration.
- Larger socket—you can wrench-up screw tighter.
- Greater engagement of head with work, greater power to clamp parts, provided by torque-lock construction.

These new Bristol socket screws are just one important example of the way Bristol research and engineering develops new products to meet the needs of modern manufacturing. They're an example, too, of the reasons you'll find precision Bristol socket screws—both hex and Bristol Multiple-Spline—in such a wide variety of modern equipment today. They're used by the millions in machinery, machine tools, appliances, instruments, computers, aircraft and missiles (including count-down, tracking, and ground-support equipment), and wherever highest standards of quality and reliability are imposed. A.9.2.

ACCO

TRADE MARK BRISTOL'S REG. U.S. PAT. OFFICE

Old dimensional standards will continue to be available.

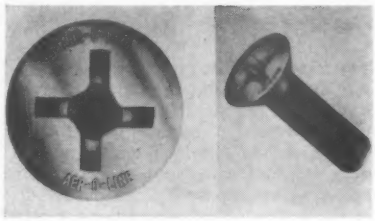
Precision socket screw manufacturers since 1913
Bristol's Hex Socket Screws
Bristol's Multiple-Spline Socket Screws
*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1½" diameter.

THE BRISTOL COMPANY
SOCKET SCREW DIVISION
WATERBURY 20, CONN.

Use postpaid card. Circle No. 245

WHAT'S NEW IN FASTENING AND JOINING

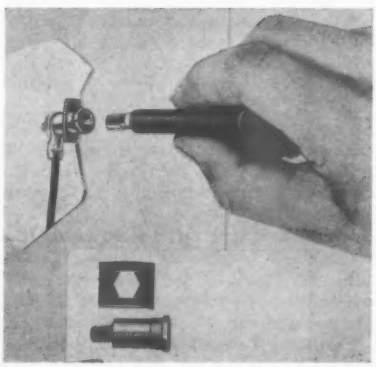
For further information on any of the fasteners or methods listed here, use the handy postpaid card opposite page 66.



(See 35)

(See 40)

(See 36)



(See 39)

OFFSET RECESS FASTENERS WILL NOT CAM OUT, REAM OUT

Alloy steel offset recess fasteners are capable of withstanding up to 300 in.-lbs. of torque per ¼-28 thread using 160,000 to 180,000 psi.

Seated with standard power or manual driving equipment fitted with offset bits, the line of units can be furnished as machine screws, bolts or self-tapping screws. They were developed for avionic applications requiring a high torque recess that would not cam out or ream out.

Recesses are offset from one another, providing added metal build-up (shoulders) between each recess.

Aer-O-Line Mfg. & Supply Co., 3110 Winona Ave., Burbank, Calif.

Use postpaid card. Circle No. 35

100 LAG BOLT SIZES STOCKED AS STANDARD

One hundred sizes of a new lag bolt will be carried as stock items, ranging in diameter from ¼" to ¾" in lengths to 12". All sizes are provided with gimlet point and full-size shank.

Standard Screw Co., Dept. CR, 2701 Washington Blvd., Bellwood, Ill.

Use postpaid card. Circle No. 36

SMALLER PANEL FASTENER WILL NOW DO SAME JOB

A 5/16" structural panel fastener can be used where formerly the ⅜" size (No. 1 in NAS 547 Specifications) fastener was required.

This new design permits structures with less clearance.

Nutt-Shel Co., Inc., 2701 S. Harbor Blvd., Santa Ana, Calif.

Use postpaid card. Circle No. 37

PANEL RECEPTACLE CONNECTS ELECTRICAL WIRE

Designed for rapid assembly into any electrical panel for connecting and disconnecting No. 10-No. 18 wires, a receptacle with mating plug can be panel mounted without special tools. Only ⅞" long, the WA 014 is knurled to prevent rotation when pressed into a panel or insulating strip and is further locked into position with a speed nut which is pushed on from the rear. A threaded stud is provided for fastening to the power source terminal lug. Samples.

Cam-Lok Division, Empire Products, Inc., Box 98, Cincinnati 36, Ohio.

Use postpaid card. Circle No. 38

STRUCTURAL ADHESIVE WITH HIGH STEEL STRENGTH

Aerobond 430 is an epoxy-phenolic adhesive for bonding of structures that must withstand temperatures up to 500°F. For short operational times it has shown useful strength up to 1200°F.

The adhesive is furnished in 36" wide rolls in thicknesses from .010" to .030", supported on No. 112 glass fabric. It is used for both metal-to-metal bonding and fabrication of honeycomb structures.

Adhesive Engineering, 1411 Industrial Rd., San Carlos, Calif.

Use postpaid card. Circle No. 39

LIQUID-STOPPING PLUG ALSO A BLIND FASTENER

A utility plug for stopping leaks in containers can also be used as a sheet metal fastener in blind applications.

The plug's neoprene gasket withstands direct steam pressure to 225 lbs.

Inserted in a drilled or punched ⅜" hole, the plug hex-head is tightened, causing the spider backing to expand and grip inside area.

Molly Corp., 230 N. 5th St., Reading, Pennsylvania.

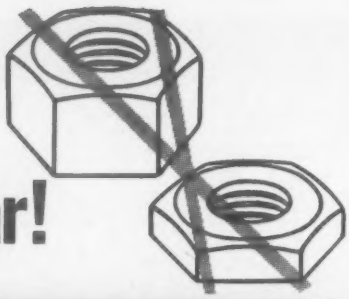
Use postpaid card. Circle No. 40

COLORED ZINC PLATING FOR WIRE FORMS

A zinc plating process in six basic colors offers designers a choice of wire/strip components and assemblies that resist corrosion and offer new appeal.

The lustre-zinc plating is applied to basic steel wire and is given a colored chromate treatment and a baked clear lacquer coating for additional protection. Basic colors available are blue, green, purple, deep-pink, copper, brass,

Save 65¢ on each Fastener Dollar!



Replace expensive heavy nuts and jam nuts with low-cost, vibration-proof

PALNUT TYPE R LOCK NUTS

All PALNUT Lock Nuts provide attractive savings—but in sizes from ⅜" and up, the ratio of economy increases dramatically. On many applications, Type R PALNUT Lock Nuts can do the job better, at ⅓ the price! PALNUT spring-tempered steel lock nuts provide rugged assembly for loads in shear and moderate tensile loads, in sizes up to 2½" diameter. In addition, you get the following design and cost advantages:

- Vibration-proof assemblies without lockwashers.
- Save Space—need only 3 bolt threads, permit shorter bolts.
- Save Weight—PALNUTS weigh 65% less than plain nuts, 80% less than plain nut and lockwasher.
- Precision Made—always fit screw threads.
- Fast Assembly with hand or power tools.
- Sizes from #3-48 Machine Screw through 2½" American Standard Heavy.

Above: A 7/16"-18 PALNUT securely fastens inlet nipple in airplane brake assembly.

Right: A ¾"-20 PALNUT used on base assembly of food mixer.

Above: A 1"-14 PALNUT holds rear view mirror bracket to cowl of automobile.

Write for literature and free samples, stating type, size and application.

THE PALNUT COMPANY, 79 Glen Road, Mountainside, N. J.

In Canada: P. L. Robertson Co., Ltd., Milton, Ont.

PALNUT® LOCK NUTS FASTENERS PAL

Quick, secure fastening at low cost

Use postpaid card. Circle No. 246

and a blend of any or all for varying shades.

E. H. Titchener & Company, 57 Clinton St., Binghamton, N.Y.

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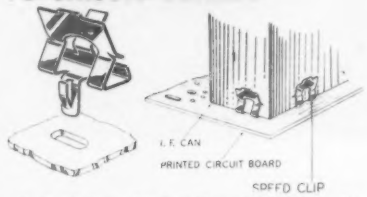
CLIP FASTENS I.F. CANS TO CIRCUIT BOARDS



A dual-functioning Speed Clip was developed to fasten aluminum intermediate frequency cans to printed phenolic circuit boards in electronic equipment.

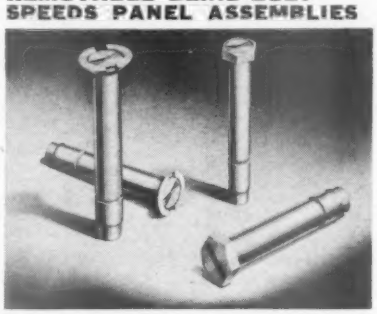
Serving also as a positive ground for I.F. cans, the clip is merely pushed by hand over the bottom edge of the can, requiring no special cut-outs in the can or special assembly tools. Two barbs on the clip bite into the side of the can. The lower half of the clip, consisting of a dart-like extension with a spring tab, is then pushed into a mounting hole in the phenolic panel. The spring tab supplies tension to hold the unit in place until the final soldering operation.

Removal of the intermediate frequency can for inspection or repair is achieved by expanding the barbed leg of the fastener away from the can with a simple tool.

Tinnerman Products, Inc., Box 6688, Cleveland 1, Ohio.

Use postpaid card. Circle No. 42

REMOVABLE BLIND-BOLT SPEEDS PANEL ASSEMBLIES



High-strength shear fasteners can be inserted, tightened up and later removed from the one side of a panel, bulkhead or sheet metal assembly with an attachment to a power tool.

The Sleev-Lock bolt will extend the use of a blind-type fastener to assemblies that have to be dismantled.

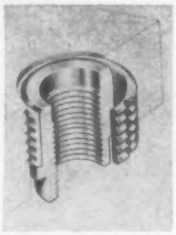
The three-piece, preassembled unit consists of outer sleeve and expandable nut with a core bolt running through the two. The nut engages the end of the core bolt.

The power tool attachment holds the outer sleeve stationary, while driving the core bolt. This draws the expandable nut up over the end of the sleeve to clamp the assembly together.

Standard Pressed Steel Co., Jenkintown, Pennsylvania.

Use postpaid card. Circle No. 43

LOCKING INSERT REQUIRES ONLY HOLE DRILLING



Hole preparation time is saved by a self-locking insert which requires only hole drilling.

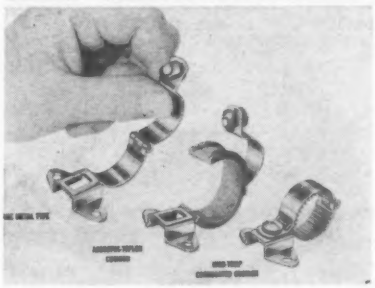
The assembly principle of the hardened steel S110 insert is to pull the internally threaded stainless steel expander into the externally grooved alloy steel sleeve, pre-positioned in the work hole. The resulting interference fit swells the sleeve, forcing its grooves into the sides of the hole.

Both power and hand tools are available for installation in metal. The insert can be used to 450°F. Six thread sizes are offered.

Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif.

Use postpaid card. Circle No. 44

QUICK-DISCONNECT LINE CLAMP RESISTS DISTORTION



A quick-disconnect line clamp is designed for all lines that have to be periodically removed for maintenance or access to adjacent equipment.

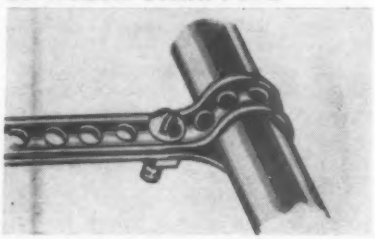
The TA5000 series can be opened and closed without removing clamp from fixed mount, resists distortion and disconnects by quarter turning a nut.

The stainless steel Flip-Loc is offered in sizes from ¼" to 6" in diameter and with four cushioning materials.

TA Mfg. Corp., 4607 Alger St., Los Angeles 39, California.

Use postpaid card. Circle No. 45

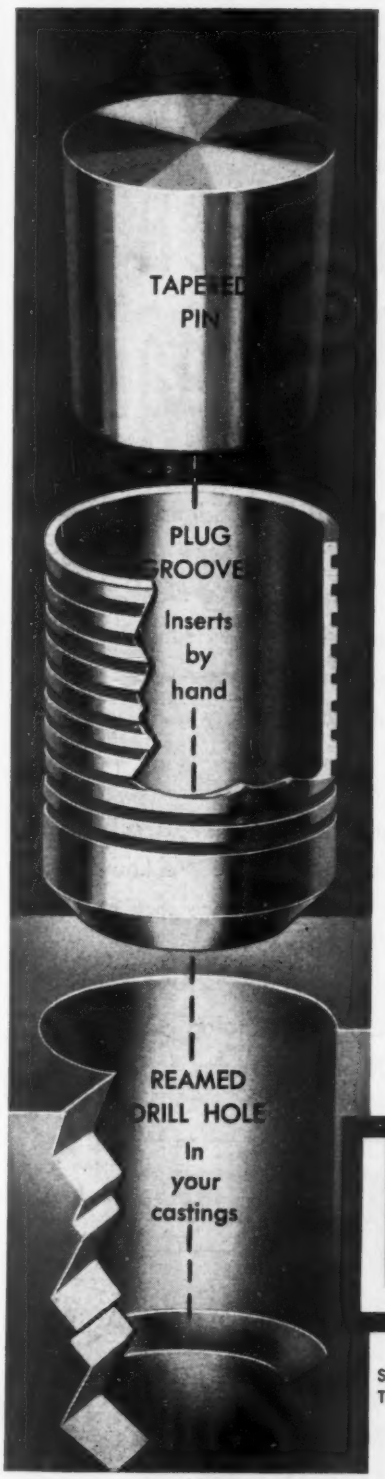
NEW SIZE ADDED TO LINE OF NYLON STRAPPING



A ⅝" width has been added to a line of nylon strapping. The new size is available in 25' and 50' rolls, black or natural color.

The strapping serves for random size cable clamps and hangers for wiring, tubing, fragile objects, switches. It can

Proved! New, Better Way to Seal Drilled Holes with . . .



Less weight!

Less cost!

NEW PIN-PLUGS°

Seal simply, positively Prevent costly leaks!

Now — forget conventional, costly methods of sealing holes that serve as flow or pressure passages. The Lee "Pin Plug" is a cylindrical plug with a tapered reamed hole partway through its center and numerous small grooves on its outside surface. Simply place it into reamed hole and drive in the tapered pin until ends are flush. Controlled expansion causes grooves in plug to "bite" into casting and form independent seals and retaining rings. Extensive laboratory tests report no leaks under normal pressures, often show bone dry seals up to pressures of 40,000 psi.

Now successfully and widely used on aircraft and missiles — for pumps, servo valves, regulators, etc. Available steel and aluminum and in both long and short series.

° Pat #2,821,323

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be safely used from —60°F to 250°F.

Weckesser Co., Dept. AE-3, 5700 Northwest Hwy., Chicago 46, Ill.

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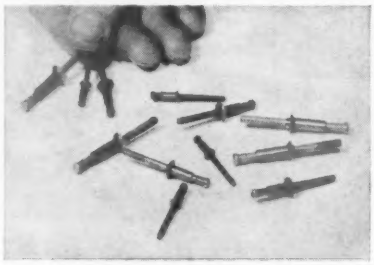
LOCK-SPINDLE BLIND RIVET WITH IMPROVED STRENGTH



A lock-spindle blind rivet gives improved strength at temperatures up to 1000°F.

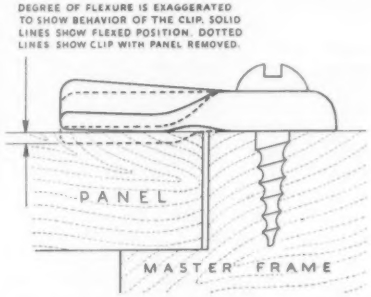
The three-piece MLS rivet consists of a monel sleeve, a pin of 17-4PH stainless steel and a monel locking collar. It is made in 1/8", 5/32" and 3/16" nominal sleeve diameters. Head styles are protruding and 100° AN427 countersunk. All sizes are available in 1/16" length increments.

The fastener is installed with standard Model 200 Pneu-Hydra tools.

Huck Mfg. Co., 2480 Bellevue, Ave., Detroit 7, Michigan.

Use postpaid card. Circle No. 47

NYLON WINDOW SCREEN CLIPS ELIMINATE RATTLING


DEGREE OF FLEXURE IS EXAGGERATED TO SHOW BEHAVIOR OF THE CLIP. SOLID LINES SHOW FLEXED POSITION. DOTTED LINES SHOW CLIP WITH PANEL REMOVED.
PANEL
MASTER FRAME

Molded nylon clips eliminate rattling in holding window screens or storm window panels in place in convertible window frames.

The high natural elasticity of nylon is put to work in a design that permits the clip to "give" under tension. Even if wind or vibration moves the window screen slightly, the nylon clip is still able to bear on it and exert the pressure needed to hold it firmly.

The clip is shaped like a shoe and in use a screw holds the "heel" tight to the master frame of the window while the "sole" bears tightly against the frame of the screen or storm window. As it is swung into place, the "sole" comes into bearing on the inserted panel, flexing the clip. This provides a positive pressure on the panel.

Gries Reproducer Corp., 125 Beechwood Ave., New Rochelle, N.Y.

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ADHESIVE BONDS WITHOUT HEAT OR PRESSURE

Without heat or pressure, an adhesive and sealer will bond iron, bronze, wood, aluminum, marble, porcelain, glass and other materials.

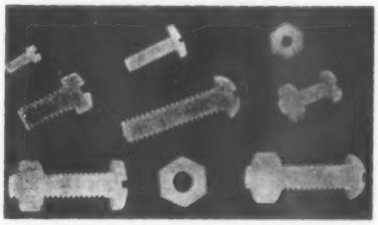
Cycleweld Liquid Iron, a putty-like synthetic plastic, sets up into a hard substance in a few hours after being mixed with a clear liquid hardener. Application of heat speeds up hardening to 20-30 minutes.

Strength is retained from 0 to 300°F. The adhesive can be ground, sanded, shaped, filed, drilled and painted.

Cycleweld Chemical Products Div., Chrysler Corp., Box 775, Trenton, Mich.

Use postpaid card. Circle No. 49

NYLON SCREW LINE IN FIVE HEAD TYPES



Nylon machine screws are molded in five commercial head types: binding, round, filister, flat and washer. Sizes range from No. 4-40 to ¼"-20 in lengths to 1". Nuts are also available.

Low dielectric constant makes the screws self-insulating and non-magnetic. Recommended for use below 350°F, or 250°F under load stress.

Richco Plastic Co., 4445 W. Fullerton Ave., Chicago 39, Illinois.

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SOLDERLESS TERMINALS ARE INSULATED, COLOR-SIZED

Insulated solderless terminals, color coded for size, are made of copper and zinc chromate plated. The line includes 13 ring tongue terminals and three butt connectors.

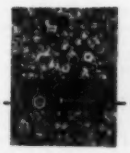
The terminals are available in kit form, which includes a new bolt cutter and crimping tool. Terminals are also

Fischer

has produced more than 2500 types of SPECIAL and odD Size precision nuts... including miniatures!

Let us quote your next order!

For details on Fischer *Turned* Brass and Aluminum Nuts, Send for catalog FS-1000.



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Please send Catalog FS-1000 and Price Lists on Fischer Brass and Aluminum Nuts.

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COMPANY_____

STREET_____

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BOLTS:
machine — carriage — lag — stove — threaded rod — studs — U — J — eye
SCREWS:
Phillips — slotted — socket — machine — wood — cap — set — thumb metal (self tapping) — Sems — spin-cork
NUTS:
hex — square — machine screw — stove bolt — finished — heavy — cap — wing-FLEXLOC — elastic —

Stainless
Monel
Brass
Bronze
Aluminum
Alloys
Steel

Corrosion Resistant

bolts, nuts screws, washers

WASHERS:
wrought — square — bevel — flat — lock — internal — external — CTSK — finishing — machine screw — SAE
MISC.:
cotter pins — taper pins — dowel pins — expansion bolts — shields — toggle bolts —

Delivered when needed . . . because our stocks, our equipment and our staff are specialized to give you quality, dependability and service. We take the pressure off your production department . . . make the job easier for your purchasing and engineering department.
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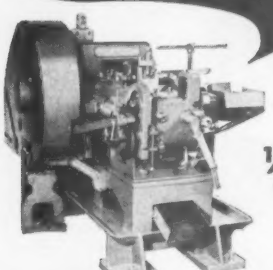
BEHR SINGLE and DOUBLE STROKE COLD HEADERS
FOR UPSETTING AND FORGING BOLTS, SCREWS, RIVET HEADS AND OTHER SIMILAR SHAPES!



¼"x2" CAPACITY

Capacity of wire, 1/4"; Stroke, 3"; Maximum length of cut-off, 2-7/8"; Maximum length of blank under head, 2"; Diameter and length of heading die, 1-3/4" x 2-1/2"; Diameter of finished punch, 1-1/4" x 2-1/4" long; Speed — Number of pieces per minute, 175; Number of strokes per minute, 350; Lubrication, Force Feed; Weight, 6000 lbs.; Overall dimensions, 81" x 46" x 51"; Motor, 5 HP, 3 phase, 60 cycle, 220/440 volts. Each header complete with motor, push button station, and foot brake.

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FOR TESTING Screws, thread-cutting and thread-forming screws—all types of threaded fasteners; threaded parts and threaded connections.

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TOOL ENGINEERS
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in assembly.

Capacities: (0-200 in. lbs.) or (0-150 ft. lbs.)

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packaged in a transparent plastic box with hinged cover and hang-up tab.

Vaco Products Co., 317 E. Ontario St., Chicago 11, Ill.

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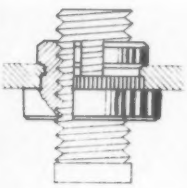
COUNTERSUNK WELD NUTS GUARD AGAINST SPATTER

Countersunk weld nuts eliminate frequent time-wasting retapping of nuts after welding. The bottom of each nut is countersunk to eliminate any fouling of the nut threads by molten metal particles dislodged during welding. The nut is immediately ready to receive the bolt. Three weld projections on the bottom of each nut provide a firm, non-rocking electrical connection during welding.

Grip Nut Co., South Whitley, Ind.

Use postpaid card. Circle No. 52

SELF-RIVETING INSERTS FOR SHEET METAL FASTENING



Self-riveting threaded inserts fasten two or more metal sheets or parts together. Knurled to prevent rotation, the inserts are pressed into drilled holes flush with the underside of the head. The screw member is turned in to open split segments which rivet the inserts securely in place.

Headless inserts are available for flush applications.

J. B. Plevyak Mfg. Co., 19 Jefferson St., Newton, N.J.

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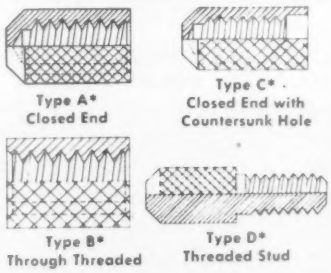
THREADED BRASS INSERTS FOR NON-METALLIC MOLDING



Closed end, closed end countersunk, through threaded, and threaded stud type brass inserts are tapped or threaded to ASME Class II specifications in sizes from 4-40 to ¼-28. Coarse knurling provides holding power when molded in plastic, rubber, ceramic products.

Holes are reamed to ease placing of inserts on locating pins and in assemblies.

Yardley Precision Products Co., 43 Afton Ave., Yardley, Pa.

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assembly and fastener engineering

DECEMBER, 1959
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231	232	233	234	235	236	237	238	239	240
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281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
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91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160

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211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230
231	232	233	234	235	236	237	238	239	240
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281	282	283	284	285	286	287	288	289	290
291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310

EDITORIAL ITEMS

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
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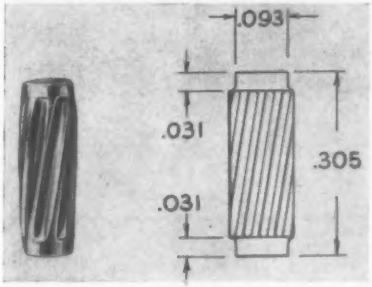
STAINLESS STEEL FLUTED PIN IS NOW COLD FORMED



Cost per thousand for a small stainless steel fluted pin has been reduced 85% through the process of cold forming.

The part would cost $19.20 per thousand when screw machined, and $2.95 when cold formed. The process is also said to provide stronger parts, smooth rounded corners without burrs and closer dimensional tolerances.

John Hassall, Inc., Westbury, N.Y.

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SELF-LOCKING SCREWS RESIST VIBRATION

A line of machine screws feature nylon inserts for locking in place. In illustration, nylon plug (A) sets up a lateral thrust, wedges mating threads together (B). Locking action is on threads: head is not stressed.

Continental Screw Co., 459 Mt. Pleasant St., New Bedford, Mass.

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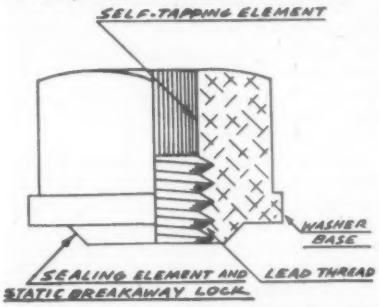
SELF-TAPPING NYLON NUTS LOCK, SEAL AND INSULATE



Nylon self-tapping hexagonal nuts with locking, sealing and insulating properties are available in many colors. They are particularly useful in appliance and electrical applications.

Brilok stop nuts lock at any position along the shank of the screw. As the screw turns into the resilient nylon, a counter-compressive force is built up, resulting in a tight friction lock.

Further tightening will cause the cone at the base of the nut to extrude into the clearance spaces. This forms a seal against liquid or gas escape, or the entrance of corrosive influences.

Pheoll Mfg. Co., 5700 W. Roosevelt Rd., Chicago 50, Illinois.

Use postpaid card. Circle No. 57

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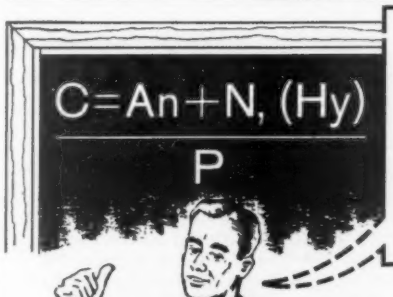

Looks complicated, doesn't it? Yet this is the formula one of our customers uses to figure tool costs! AND IT PAYS!

If you would like information on this formula and additional facts on ways it may be applied to reduce and control costs—then drop us a line and we will send you a Booklet without any obligations that will give you some ideas!

Our business is tooling for the Fastener Industry and our one objective is to make better tools to lower your costs.

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R B&W FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

Technical-ities

By John S. Davey

The strength of nuts

With a hard, heat treated nut, ability to plastically adjust and distribute load over many threads diminishes. High loads tend to concentrate on first thread severely enough to cause stripping . . . or fracture of first thread, which causes locking. Nut then cannot increase tension in bolt.

Untreated nuts are strong enough for most needs, and don't pose this problem.

A CAUSE OF STRIPPING

Upon tightening, a nut both compresses and dilates. Dilation can be overcome by wall thickness only, not by added height or heat treatment.

Dilation is important since a reduction in area of bolt under tension accompanies it. Threads pull away from each other, from their stronger base to weaker tips. The shallowness of *fine* threads can cause progressive shear.

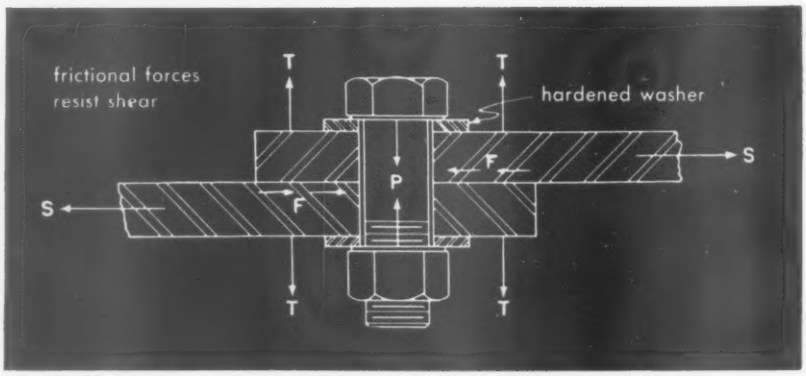
That's why High Nuts (with fine threads) are no answer where "Heavy" Nuts (with coarse threads) are.

WRENCHING STRESS HIGHEST

Rotation of nut produces both tension and torsion in bolt. The force applying this combined stress is about 20% greater than the load which must be sustained when rotation stops.

Thus . . . if a nut hasn't failed in wrenching, it can still withstand at least 20% more direct pull than it sustained during the tightening.

Why high strength bolts make superior joint for dynamic loads



Washers prevent crushing under head and nut with consequent grip relaxation.

While fasteners must be strong enough to carry the calculated loads, what makes a *joint* truly strong is the *residual tension* after wrenching.

NO SLIP OR SEPARATION

Consider the simple lap joint in sketch. Practically rigid, this joint is subjected only to: (1) external tension forces "T" tending to separate the plates against bolt clamping force "P"; (2) shear forces "S" tending to make plates slip against friction resistance "F".

"F" increases when "P" does. With enough clamping force applied, shear loads transfer from one plate to the other without slippage. And when clamping force always exceeds tensile forces, plates obviously *cannot* separate. There can be no further stretch on bolt. Its load stays static at preload "P", even when external loads are dynamic.

UNIFORM CONTROL OF PERFORMANCE

RB&W high strength bolts allow a high magnitude of clamping force to be applied . . . and *uniformly* so. Materials conform to ASTM specifications. Applying known torques to nut produces uniform bolt tensions. Riveting by contrast, depends on difficult-to-control variables.

MORE STRENGTH OVERALL

For shear-resistance, riveted joints offer only the actual rivet shear strength. Don't count too much on friction even though rivets exert some grip as they cool. Compare: a 1-inch bolt tightens to a tension of 42,000 lbs; a 1-inch rivet develops 22,000 lbs at best.

The higher residual tension does more than make a joint much stronger in shear and in tension. It also protects the bolt against fatigue caused by stress-reversing cycles such as vibration; keeps the bolt from loosening, too.

All this explains why, under heavy dynamic loads, rivets can loosen, elongate holes, often fail, requiring difficult replacement; but high strength bolts stand up. They can keep connections permanently tight on vibrating machinery, heavy duty conveyors, and transportation equipment.

Talk it over with an RB&W fastener expert. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W high strength bolts are from selected grade of medium carbon steel with proper combination of ductility and tensile strength; conform to ASTM A325.

Plants at: Port Chester, N.Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

Use postpaid card. Circle No. 255

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 66.

SCREW THREAD CHART

Unified and American external screw threads from American Standard 1952-ASA-B1.1 are shown on an 8½" x 11" chart printed on cardboard. Sizes, tolerances, major and pitch diameters and other facts are listed. Cross-sectional drawings and definitions explain various terms applied to threads. Ohio Rod Products Co., Inc., 20265 1st Ave., Berea, Ohio.

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ASSEMBLY PIN

Heavy, medium and light duty spiral pins are described for mechanical and electronic assembly operations. A 12 page technical brochure lists prices by quantity, specification and material. Self-locking Spirol pins eliminate reaming, assume the shape of the hole. Applications are pictured. C.E.M. Co., 24 School St., Danielson, Conn.

Use postpaid card. Circle No. 76

CAP, SET SCREW HANDBOOK

A 36-page engineering handbook (No. 500) on cap and set screws is sectionalized for fast reference. Emphasis is laid on the difference between the 1936 and new 1960 series of socket head cap screws. A special insert discusses the IB socket head cap screw. Specifications are given on the complete line. Mac-it Parts Co., 275 E. Liberty St., Lancaster, Pa.

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COMPRESSED AIR BASICS

"Compressed Air Fundamentals" helps in the selection of small "packaged" air compressors. The 16-page booklet describes how air is compressed, single- and two-stage compressors, piston displacement, actual delivery, unloading of compressors, regulation and types of control used. Tabular and chart information includes: cubic feet of air required to operate a variety of pneumatic equipment, average and continuous air supply tables, ratios of compression and flow of air through orifices. Ingersoll-Rand Co., 11 Broadway, N.Y. 4, N.Y.

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SPECIAL FASTENERS

Engineering experience and facilities available to produce special fasteners are emphasized in a four-page brochure. Also, pictured and specified are various washer types, Sems, Tuff-Tite preassembled screws and neoprene washers, leveling screws and the self-tapping Schweppe stud. Pheoll Mfg. Co., Inc., 5700 Roosevelt Rd., Chicago 50, Illinois.

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MOUNTING FASTENERS

One-piece self-locking fasteners that reportedly eliminate the need for brackets and clips are described in a 15-page brochure. Designed for aircraft and electronic applications, the fasteners combine a mounting bracket and Heli-Coil locking insert. They are dimensionally illustrated and specified. Nylon flip grommets are also introduced. Western Sky Industries, 21301 Cloud Way, Hayward, Calif.

Use postpaid card. Circle No. 80

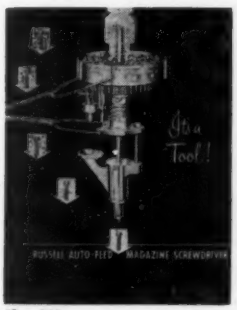
SCREWDRIVER ATTACHMENT

Action of an automatic magazine-fed screwdriver attachment for verticle spindle machines is described in four-page Form 101-EM56. The seven Russell Auto-Feed sizes are pictured and specified. Torque adjustment is illustrated. H & G Sales Corp., Box 1589, New Haven 6, Connecticut.

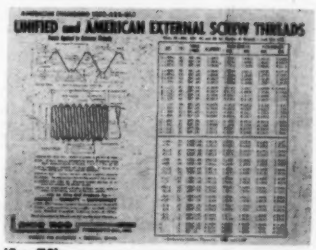
Use postpaid card. Circle No. 81

INDUSTRIAL ADHESIVES

Adhesives designed for specific uses are featured in a six-page flyer. Metal-to-plastic adhesives, vinyl-to-metal, wood and other materials are available in 50, 5 and 1 gallon containers. Various



(See 81)



(See 75)

(See 76)

contact cements are discussed. Hadley Bros.-Uhl Co., 514 Calvary Ave., St. Louis 15, Missouri.

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LOCK NUTS

Stollock nuts stay locked with a friction grip anywhere on the bolts. Features and specifications of the prevailing torque type nut are presented in a four-page brochure. Three thread indented pads assure the lock. Thread-All Sales Co., 1045 Perry St., Detroit 1, Michigan.

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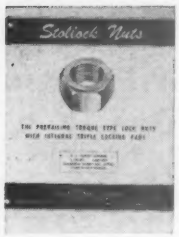

SPRING DESIGN "SECRETS"

Interesting facts about the properties of springs are pictured and described in a four-page brochure. Things to remember in designing compression, extension, torsion, flat or wire form springs for maximum strength, tension and spring without wasting material are outlined. Spring Div., Rockwell Standard Corp., Chelsea 60, Michigan.

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SEALING FASTENERS

Features of screws and bolts with pre-assembled neoprene washers are discussed in four-page brochure 256-10M. How Tuff-Tite fasteners seal, cushion, resist squeaks and vibration is told in text and drawings. Specifications of truss, pan and hex headed parts are listed. The National Screw & Mfg. Co., 2440 E. 75th St., Cleveland 4, Ohio.

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PLIER-TYPE TOOLS

From three basic plier actions many assembly tools are continuously being designed, both as standards and specials. A 34-page catalog shows case histories of how these pliers are developed for specific functions. Each tool is specified and pictured in use. Application data is indexed by industry user and material processed. Sargent & Co., 45 Water St., New Haven 9, Conn.

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ELECTRICAL CONNECTING

"Pres-Sure-Tips" gives 25 applications of a line of connectors for solderless wire splicing and terminating. The vest-pocket sized, 36-page booklet contains over 70 drawings showing how such jobs as splicing from 2 No. 18 through 2 No. 4 wires can be speeded. A chart lists wire combinations approved by UL and CSA using firm's splice caps. Buchanan Electrical Products Corp., 227 Route 22, Hillside, N.J.

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MOUNTING PLUG

Applications of a plug which can be used for mounting fixtures, emergency repairs or as a blind bolt are described in a four-page, pocket-sized flyer. Installation technique is pictured step-by-step. Molly Corp., 230 N. 5th St., Reading, Pennsylvania.

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DESIGNING DELRIN PARTS

Designers will find eight-page Bulletin 1001 informative on the features of injection molded Delrin parts. Strength characteristics of the du Pont acetal resin are graphed; cost benefits of the molding process are pointed out. Gries Reproducer Corp., 125 Beechwood Ave., New Rochelle, N.Y.

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HOW TO SELECT TERMINALS

Showing the user how to choose the best kind of terminal for his particular wiring application, a four-page brochure illustrates basic types of electric terminals and connectors ranging from the "ring" and other standard tongue designs through multiple-wire connectors and quick-disconnects. Performance features of each are compared. A cutaway view shows construction details of a typical terminal. ETC Incorporated, 990 East 67th St., Cleveland 3, Ohio.

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SEMS

Attractive 36-page Catalog AS-62 treats six basic types of pre-assembled lock washer and screw units. Cost and functional advantages of Sems on the assembly line are pictured and described. Technical data includes dimensional drawings and specifications for dozens of standards and specials. Tightening torques are recommended. Shakeproof, Div. of Illinois Tool Works, St. Charles Rd., Elgin, Illinois.

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SELECTING CONVEYORS

How to select the type of conveyor equipment best suited to a user's needs is the theme of a 26-page catalog. Each type of gravity and power conveyor is pictured and described in a reference chart. Over 100 photos show various conveying applications. Standard Conveyor Co., 315 N. W. 2nd St., North St. Paul 9, Minn.

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TERMINAL CHART

A quick-reference wall chart (21" x 27") shows 60 of the most used Cambion solder terminals in scale drawings with dimensions and materials. Also described is a solder terminal kit for design engineers. Cambridge Thermionic Corp., Concord Ave., Cambridge 38, Massachusetts.

Use postpaid card. Circle No. 93

WIRE FASTENERS

A wide variety of wire fasteners are displayed in 30-page Catalog 600. Actual size illustrations and specification data on screw eyes, hooks, hand rail screws, dowels, U-bolts, angles, pins, are presented. Merrill Mfg. Corp., Merrill, Wisconsin.

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COLD HEADING WIRE

Characteristics of extruded cold heading wire (cartridge brass 70%) are presented in a three-color, four-page bulletin. Applications and advantages, stock tempers and specifications are listed. How the wire is made from billets in a continuous casting process is described. Scovill Mfg. Co., Mills Div., 99 Mill St., Waterbury 20, Conn.

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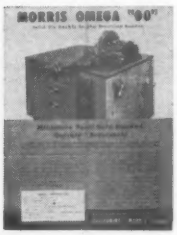

HEADING MACHINE

A solid die double stroke header is pictured and described in two-color Bulletin 10. The Omega "OO" cold heads miniature parts requiring high precision. The Robert E. Morris Co., Box 41, West Hartford 7, Conn.

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PRESS WELDERS

A line of press-type spot and projection welders is covered in brochure P59. The illustrated booklet gives complete description and specifications of four available sizes, ranging in capacity from 30 to 500 kva. The Federal Machine and Welder Co., Warren, Ohio.

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RIGHT ANGLE NUTSETTERS

Right angle nutsetters are the topic of two-page Bulletin NS-558. The tools have a torque range at 90 psi of 15-50 ft.-lbs. Text and photos bring out complete details and specifications. Cleco Air Tools, P.O. Box 2119, Houston 1, Texas.

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CREATIVE FABRICATION

Standard and special fabricated products—metallic and non-metallic washers, gaskets, stampings, washers, die cut parts, shims and spacers—are detailed in a four-page brochure. Creative design facilities are emphasized. Bartite sealing washers for construction applications are described. L. J. Barwood Mfg. Co., Inc., Everett 49, Massachusetts.

Use postpaid card. Circle No. 99

SPRINGS, WIRE FORMS

A four-page mailing piece is written to aid in the specifying of springs and wire forms. Design information, materials and facilities available and commercial tolerances for manufacturing coil springs are listed. Typical parts are pictured. Eiler Equipment Co., 1107 S. 2nd St., Minneapolis 15, Minn.

Use postpaid card. Circle No. 100

ARC WELDER

A completely-re-engineered line of rectifier type units (300 Series) for inert gas and metallic arc welders is presented in four-page technical Form 300-2. Each feature is pictured and described. Specifications (range, power input at rated load) are charted for four standard models. Miller Electric Mfg. Co., Inc., Appleton, Wis.

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DESIGNING WITH NUTS

Suggestions for designing to use weld nuts, clinch nuts, a quick-attachment nut and various stampings and clips are included in a 16-page general catalog. Standard caged, floating and pilot-type weld nuts are specified and drawn in dimension. Installation procedure for some parts is shown. A helpful torque specification chart for mild steel nuts is listed. The McLaughlin Co., 212 Jaikins Bldg., Birmingham, Mich.

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DRIVE RIVETS

Where and how to use hammer-driven rivets is told in eight-page bulletin DRA 659. Specification tables are given for rivets from 1/8" to 1/4" diameter in steel and aluminum. Fourteen time-saving applications for the blind rivets are pictured. Southco Div., South Chester Corp., Lester, Pa.

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SELF-LOCKING INSERT

A four-page brochure introduces the S110 stainless steel, threaded insert. Illustrations and text show installation and design features. Test results on push-out, torque-out and tensile strength are graphed. No hole tapping is required. Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, Calif.

Use postpaid card. Circle No. 104

TOOLING ACCESSORIES

Accessories for jigs, fixtures, dies and original equipment are presented in eight-page Catalog 58. Spring and ball plungers, torque thumb screws, toggle and leveling pads, swivel-pad clamps, stops and keys are pictured, drawn in dimension and specified. Vlier Engineering Corp., 8900 Santa Monica Blvd., Los Angeles 46, Calif.

Use postpaid card. Circle No.105

PROGRAMMED WELDS

"Programmed Time-Amperage Control for Critical Welding" describes five units for the sequence timing of welds, including motorized rheostat controls and punched-tape programming. The four-page bulletin charts several time-ampere patterns possible. Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.

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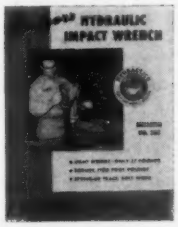

HYDRAULIC IMPACT WRENCH

Bulletin 338 explains how a 37-lb. hydraulic impact wrench can speed up track bolt work. The unit has a torque of 1100 ft.-lbs. at 2000 psi. Accessory equipment is described. Rodgers Hydraulic, Inc., 7401 Walker St., Minneapolis 26, Minnesota.

Use postpaid card. Circle No. 107

ASSEMBLY CLIPS

A line of alligator clips for quick assembly or temporary connection applications in electronic, electrical, automotive or industrial fields is offered in Catalog 220. Sizes range from miniaturized clips to welding ground clamps. Mueller Electric Co., 1597 E. 31st St., Cleveland 14, Ohio.

Use postpaid card. Circle No 108

COLD HEADED SPECIALS

Job-designed fasteners are cold-headed in any metal, quantity or size, as pointed out in a four-page bulletin. Typical parts are pictured. Secondary operations are described. John Hassall, Inc., Box 2246, Westbury, L.I., N.Y.

Use postpaid card. Circle No. 109

TORQUE TOOLS

More than a dozen different types of torque screwdrivers, wrenches and special tools are specified in four-page Bulletin 7705. A section shows users how to check torque tools using the dead weight method. Illustrated. Apco Mossberg Co., 1005 Lamb St., Attleboro, Mass.

Use postpaid card. Circle No. 110

PARTS FEEDERS

Both delicate and sturdy parts can be safely fed from six standard bowl feeders specified in a four-page technical bulletin. Weights, dimensions in inches, input watts required and dimensional drawings are given of units in sizes from 5" to 30". Machine tools to which the feeders can be attached are listed. Detroit Power Screwdriver Co., 2801 W. Fort St., Detroit 16, Mich.

Use postpaid card. Circle No. 111

LATCHES

A unique 30-page brochure on general purpose latches is ideal for tracing purposes. The publication is laid out so that housings may be traced from one set of pages and suitable fittings from a matching set of pages. Simmonds Aerocessories, Inc., 105 White Plains Rd., Tarrytown, N.Y.

Use postpaid card. Circle No. 112

PRESS NUT

Engineering data sheets describe a press nut fastener used in cold flow sheets, extrusions or castings. Eight typical applications are drawn and explained. Rosan Inc., 2901 West Coast Hwy., Newport Beach, California.

Use postpaid card. Circle No. 113

PNEUMATIC RIVETERS

A complete line of eight single and multiple rivet setters—air-powered and air-cushioned in operation—are described in a four-page bulletin. Air operation permits use of semi-tubular rivets for fastening fragile materials in conjunction with metals. Breakage and rejects are thus minimized. Chicago Rivet & Machine Co., 950 S. 25th Ave., Bellwood, Illinois.

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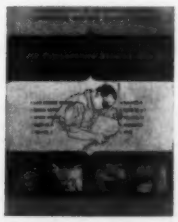


BRAZING ALLOYS

The properties and uses of five alloys for low temperature brazing are described in a four-page bulletin. Low fuming bronze brazing rods, silver solder, flux and aluminum welding wire are also specified. American Brazing Alloys Corp., Box 11, Pelham, New York.

Use postpaid card. Circle No. 115

AMERICAN STANDARD TAPS

"American Standard Taps—Cut and Ground Threads, B5.4-1959" is a 48-page revision including industry changes through 1957. Tap styles, thread series data, standard system of marking and dimensional and tolerance tables for right hand thread taps of eight types are included. $2.50. ASA, 70 E. 45th St., New York 17, N.Y.

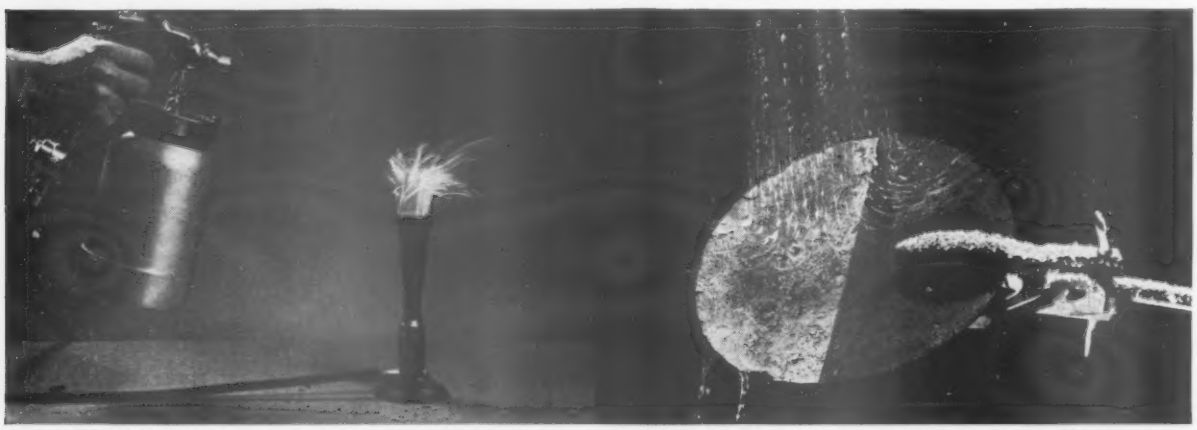
ASSEMBLY TOOL MANUAL

"How to Choose and Use Portable Air Tools" suggests how to get more from the portable tool dollar. The 91-page handbook is comprised of 14 articles reprinted from technical magazines on the subjects of increasing productivity through better air pressure; maintenance; tool selection; and safety. Free when requested on company letterhead. Rotor Tool Co., Dept. AF, 2600 Lakeland Blvd., Cleveland 32, Ohio.

Improve product performance, cut costs with 3M Adhesives, Coatings and Sealers

VIBRATION RESISTANT. Tough aluminum strips (bonded in the middle, above) tear before EC-801 bond separates! This versatile sealer is especially suited for integral fuel tanks, keeps them tightly sealed in spite of vibration and flexing. Highly resistant to aircraft fuels; adheres firmly to metals at temperatures from—65°F. to 180°F.

MOISTURE RESISTANT. EC-1300 grips like a bear while wet, speeds rubber-to-metal bonding. Synthetic rubber base has light color for less clean up. EC-1300 sets fast, bonds tightly with no cold flow under pressure. Bonds foam, sponge, extruded and mechanical rubbers fast with moisture-resistant, flexible film.



FIRE RESISTANT. This Bunsen burner can't ignite wet, adhesive EC-321—proof this adhesive can safely be used anywhere on the assembly line. Ideal for bonding sound deadening pads, insulation butts and lightweight padding. High wet strength allows production to continue as adhesive dries. Apply with spray gun, brush or roller.

CORROSION RESISTANT. Rugged torture test! 2000 hours exposure to salt spray; 20 weeks submersion in 20% solution of hydrochloric acid; six-month weather exposure in Miami, Florida proved CORO-GARD® 1706 Brand Protective Coating resists abrasion and corrosion. For steel, aluminum, wood, concrete, cloth and some plastics.

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SEE WHAT 3M ADHESIVES CAN DO FOR YOU! Look to 3M with your next adhesive, coating or sealer problem. Call your 3M Field Engineer. Or, for more information and free literature, write to: AC&S Division, 3M, Dept. SAZ-129, 900 Bush Avenue, St. Paul 6, Minnesota.

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MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

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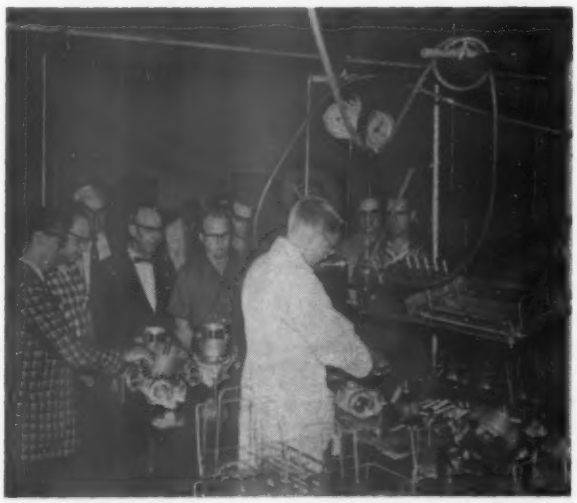
INDUSTRY MAKES NEWS

Standard Pressed Steel's new exotic metals plant will be the first in the industry to fabricate lightweight beryllium into threaded fasteners.



General Electric dealers visiting G-E's Central Air Conditioner plant at Tyler, Tex., observe the assembly of hermetic compressors. Precautions are taken to prevent dust from infiltrating the units during assembly.

GROUP PURSUES PARTS STANDARDIZATION

An industry-Department of Defense conference for integration of efforts to standardize threaded fasteners was held at Headquarters, Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio, this fall.

Ways of achieving closer relationship between industrial-professional activities, producing and using standards and their Governmental counterparts, were discussed. Col. C. N. Howze, chief of AMC's Cataloging and Standardization Division, was host. Martin F. Connolly, chief of Standardization Branch, was chairman.

Representatives of 11 industries, the National Bureau of Standards, five each from the Army and Navy, and three from Mobile (Ala.) Air Materiel Area, attended.

GE DEALERS OBSERVE APPLIANCE ASSEMBLY

General Electric dealers and utility representatives recently toured G-E's Central Air Conditioner Plant at Tyler, Texas to see first-hand how the equipment is manufactured.

The visitors observed the assembly of full-hermetic compressors. The compressors are assembled in a special surgically-clean room, in which both temperature and humidity are closely controlled. Special lint-free shop coats are worn by all workers, and the floors, of edge-grained hardwood, are vacuumed twice daily, to avoid any possibility of dust finding its way into the units.

BERYLLIUM BOLTS FROM NEW SPS PLANT

Missile and satellite fasteners made from the nearest thing to an anti-gravity structural metal yet developed will be produced in a new exotic metals facility just opened by Standard Pressed Steel Co. in Jenkintown, Pa.

The $100,000 pilot plant operation is the first in the fastener industry to fabricate featherweight beryllium—one fourth the weight of steel and currently more costly than gold—into threaded parts.

Since its weight is only one-fourth that of ferrous metals and present-day superalloys, a beryllium

continued

bolt that can support a load of 125,000 lbs. psi is, on a strength-to-weight basis, the equivalent of a steel bolt with 500,000 psi tensile strength. But the strongest steel bolts on the scene today are rated at only 260,000 lbs. psi. Beryllium is less than half the weight of titanium and only 70% that of aluminum.

Though bar stock material rated at 125,000 psi tensile strength is being produced, this does not mean that this full strength can yet be utilized in a threaded fastener for every application, SPS reports.

Completely inclosed grinder is one of the production machines in the new SPS exotic metals laboratory in Jenkintown, Pa.

Beryllium, like titanium before it, is exceptionally notch sensitive. Parts with notches—such as threads or bolt heads—do not necessarily have the same strength as the material from which it is made.

K S M PRODUCTS TO BUILD NEW PLANT

K S M Products, Inc., has recently broken ground for its new plant and office facilities. The new building will be located on a 12-acre tract in Moorestown, N.J., approximately four miles from the firm's headquarters now located in Merchantville, N.J.

The new facilities will be three times the size of the present operation. Occupancy is expected in the spring of 1960.

FERRY NAMES H. D. NORTH, JR., PRESIDENT

Harold D. North, Jr., has been elected president of The Ferry Cap & Set Screw Co., Cleveland, Ohio, announced J. M. Killpack, chairman. He comes to the company from the Engine Parts Mfg. Co., Cleveland, where he was executive vice-president.

North's grandfather was one of the founders of Ferry Cap & Set Screw Co. in 1906. His father was president for 20 years and chairman of the board at the time of his death in 1956. North has also served with the Harris Calorific Co. and the Hoover Co., North Canton, Ohio. He is a 1936 graduate of Cornell.

HOWE SOUND ACQUIRES SPERRY PRODUCTS

On October 23, Sperry Products, Inc., Danbury, Conn. was acquired by The Howe Sound Company, a New York City concern with diversified manufacturing and mining interests. According to Frank U. Hayes, president of Sperry, "We will continue to operate as before. If there is a change here, it will be in the direction of growing. Howe Sound has a policy to expand."

NEW ENGLAND SPRING MFGS. ELECT PRES.

Frederick R. Downs, Jr., sales manager for Stanley-Humason, Inc. of Forestville, Conn., a subsidiary of The Stanley Works, was elected president of the New England Group of Spring Manufacturers at its annual meeting held in Bristol, Conn., on Oct. 22. The organization is affiliated with the National Spring Manufacturers Association, Inc.

Set Screw Users

Moore offers you a fast, dependable and economical source for one or a million

Moore Set Screws are precision-made and are backed by over 75 years of design-engineering and manufacturing experience. They are of proper hardness for maximum strength and life; they have accurate threads for secure locking action; and they are quality controlled for consistent uniformity. You get fast delivery . . . off the shelf on standard items; two or three-day part shipments on specials.

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Condensed Specifications

	Headless Slotted	Square Head	Socket Head
Size (dia.)	#0 to ¾"	#6 to ⅜"	#4 to ⅜"
Lengths	1/16 to 3"	3/16 to 2½"	1/8 to 1"
Points	cup, oval, round, flat, cone, dog		
Materials	steel, brass, bronze, stainless, aluminum, alloy steel, monel		

Special Heads — milled, slabbed, double slot, knurled.

Miniature Headless—#0, #1, #2, #3 sizes in a wide selection of metals, finishes, lengths and points.

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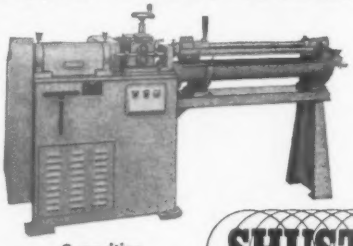
NEW SHUSTER

Wire-Straightening & Cutting Machine with *"Unitized Construction"* ...Improves your product while it cuts your costs!

Model 1AVS — a *New* "Production Booster"
VARIABLE SPEED • AUTOMATIC • ELECTRICALLY CONTROLLED



Capacities
1AVS-5—3/32" to 1/4"
1AVS-3—1/16" to 3/16"

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• Rigid, "Unitized Construction" gives amazingly smooth, quiet performance • New electro-mechanical positive release target eliminates jamming • High-speed straightening arbor boosts production • Infinite variable speed control • Timken bearing-equipped feed-roll housing—gears running in oil • Larger catch pan • Ideal working height.

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153 Adeline Street
New Haven, Connecticut

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WORLD PARTS STANDARDIZATION MEETING

Richard B. Belford, leader of the U.S. delegation to the October meeting of the International Organization for Standardization on bolts, nuts and accessories, reported on the Milan, Italy, conference at a Nov. 10 press conference in Cleveland.

Belford, technical advisor of the Industrial Fasteners Institute, reported that 71 delegates from 40 nations were present. John R. Rees, National Bureau of Standards, and Robert M. Byrne, U.S. Screw Service Bureau, also represented the U.S.

Accomplishments of the meeting were:

1. Determination of widths across flats and head heights for two series of hexagon head bolts, and widths across flats and thicknesses of one series of hexagon nuts, all in metric measure. Recognition for a parallel series of hexagon head bolts and hexagon nuts in inch measure. Dimensions for these latter products will be based on existing American Standards.
2. Establishment of a research project to investigate and recommend limits for radii under the head of bolts. (This is the fillet radius at the junction of the head and shank.)
3. Development of a series of standard lengths for bolts in metric measure.
4. Authorization for development of a standard for hexagon-head socket screws in metric measure which would parallel the new American 1960 series of hexagon socket head cap screws.
5. Development of a dimensional standard in metric measure for hexagon slotted and castle nuts.
6. Initiation of a project to prepare an international specification covering strength properties of fasteners.
7. Review of a proposed standard for cotter pins, which with slight revision appears will be acceptable to all countries.
8. Study of cross-recess dimensions for screw heads.
9. Acceptance as an international standard of Types A and B threads as used on thread-forming tapping screws. The metric standard will be a straight conversion from the inch standard as contained in the American Standard for tapping screws issued in 1958.
10. Continuation of work on a document which would illustrate and describe, in four languages, all the various types of standard fasteners, and the special characteristics and elements of each.

SALES CHANGES AT ASSOCIATED SPRING

Three divisional sales supervisors and a purchasing agent have assumed new positions with the Associated Spring Corp., Bristol, Conn: Sales—N. J. Coulles at the B-G-R Division, Plymouth, Mich.; Troy L. Sorensen, Gibson Division, Chicago; and John V Gidley, Jr., Milwaukee Division, Wisconsin. Purchasing agent of Ohio Division, Dayton, Ohio, is Raymond G. Chenoweth.

SHUR-LOK ADDS CHERNE TO MANAGEMENT

Shur-Lok Corporation, Anaheim, Calif., has named Jack M. Cherne assistant to the president, it was announced today by Frederick W. Rohe, president.

Cherne comes from Vard, Inc., where he was director of engineering. His 17 years in the aircraft field include project engineer in charge of helicopter development and flight test at Hughes Tool Company, assistant chief of stress at Sikorsky Aircraft, and the management of Electro Mechanical Devices.

ENGINEERS PROMOTED AT NAT'L ELECTRIC

Two promotions, marking the expansion of the development section of National Electric Welding Machines Co., Bay City, Mich., have seen Paul Thorne, formerly chief electrical engineer, named chief electrical and development engineer. His new duties involve development of electronic applications in the building of automated welding machines. He will also be in charge of the laboratory and samples section.

continued

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NOW MORE EXTENSIVE THAN EVER—OUR COMPLETE LINE OF INDUSTRIAL FASTENERS AND COLD-HEADED SPECIALTIES

These are just a few of the many Everlock industrial fasteners used consistently by leading automotive, appliance and other metalworking manufacturers—some of them our customers since 1918. When you buy Everlock fasteners, you deal with one of the few completely integrated manufacturers of lock washers, Sems, thread-cutting screws, terminals and cold-headed specialties. We are prepared to deliver on short notice a complete line of competitively priced, top quality washers from stock in our plant or your local distributor's warehouse. Talk to your local Everlock representative for expert assistance with fastener problems or use the coupon to send for samples and our current catalog. Blueprints welcome! Let us quote on any of your fastener needs.

A. Sems—Available with any style head, thread, washer and point. **B. Terminals**—Tooth-type locking or plain. **C. Thread-Cutting Screws**—Type 1, 23 and 25. **D. Lock Washers**—Tooth-type lock available in internal, external, countersunk, combination internal-external, dish-type, and dome washers. Also Belleville or serrated Belleville.

AMF Everlock INDUSTRIAL FASTENERS

Thompson-Bremer & Co.
Division of American Machine & Foundry Company

Thompson-Bremer & Co., 228 N. LaSalle Street, Chicago 1, Ill
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Harold Bach, 20-year veteran with the company and former manager of the service and research section, has been named chief welding engineer.

TELECOMPUTING BUYS MONROVIA AVIATION

Monrovia Aviation Corporation, a subsidiary of Carrier Corporation, has been purchased by Telecomputing Corporation, Los Angeles. The price was understood to be in excess of $2 million. The Monrovia, Calif., company manufactures aircraft sub-assemblies. Roy E. Hughes will continue to serve as Monrovia's vice president and general manager.

HOUGHTON ADDS TO OFFICE FACILITIES

Houghton Laboratories Inc., has broken ground on a new addition to their Olean, N.Y. offices it was announced by Donald Roon, president. The new building has been designed specifically to house the company's growing marketing organization and will approximately double existing office space.

UNITED-CARR NAMES FINANCE EXECUTIVES

Three new appointments to top financial posts were announced today by Samuel A. Groves, president, United Carr Fastener Corporation, Boston, Massachusetts.

LUNDBERG

TAYLOR

In the newly created position of vice president for finance, Edward P. Taylor will supervise all financial operations of United-Carr and its 10 divisions and subsidiaries. He was formerly treasurer of the Industrial Rayon Corporation, Cleveland.

Alvin F. Lundberg, who has served as controller of United-Carr for many years, has been advanced to the post of treasurer. Andrew J. Kelley has been appointed controller after serving as Assistant Controller since 1953.

WELCOME DISTRIBUTOR—Peter B. McSherry, Parker-Kalon vice president, welcomes John N. Failing, vice president of The Chas. A. Strelinger Co., Warren, Mich., into the P-K distributor organization. Looking on are V. Lee Edwards, president of Strelinger, and Gilbert Harrell, P-K regional sales manager.

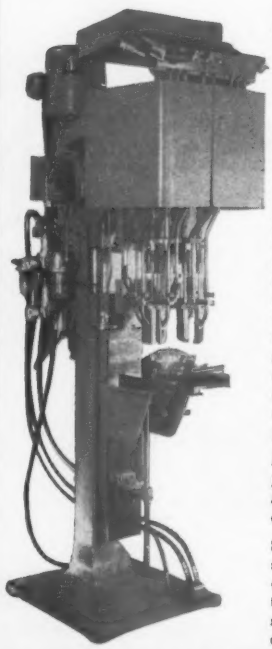
HUCK NAMES TEXAS ENGINEERING REPS

Fred J. Coelen and Richard D. McChesney have been appointed engineering representatives of the Huck Mfg. Co., Detroit, Mich. They will assist fastener users in the lower three-fourths of Texas.

Coelen was formerly senior standards engineer with Chance Vought Aircraft in Dallas and McChesney has had 12 years with Dixie Bearings, Inc.

William C. Williams has been appointed engineering representative in the eastern Sales Division to assist fastener users in North Carolina, southern Virginia and the northeast portion of South Carolina. Prior to joining Huck, he had been associated for nearly nine years with Southern Railway Co. in a variety of engineering, manufacturing and management positions.

this machine will drive up to 10 screws at one time . . .



. . . reducing assembly costs and improving quality. Built for high production jobs where a fixed set up is practical, this multiple spindle screw driving machine automatically feeds screws from a hopper and drives them to a predetermined torque. Evenly distributed pressure eliminates stresses caused by driving home one screw at a time. A simple sliding fixture positions work pieces accurately.

Machine illustrated shows application of multiple spindle screwdriving to assembly of electric power drills.

Send a sample of your assembly and a list of your requirements. We will be happy to show you how multiple spindle screw driving can be applied to your job.

COOK & CHICK COMPANY
2415 West 24th Street Chicago 8, Illinois

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cold headed
FASTENERS
and small parts

Just to give you a real live, in your hand, sample of the tremendous possibilities in cold heading, we'd like to send you absolutely free a sample package of typical Hassall products.

Just check the inquiry card and your samples will be on their way.

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Westbury, Long Island, N. Y.

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SCHWARTZMAN MFG. FORMS NEW PARTS DIV.

A Special Products Division has been formed to handle the manufacture of special fasteners in the J. S. Screw Division of the J. Schwartzman Mfg. and Supply Co., N. Hollywood, Calif. Facilities in a 50,000 sq. ft. plant will be made available.

ANCHOR FASTENERS PROMOTES TWO

LARGAY

O'BRIEN

John A. Largay, president of Anchor Fasteners, Inc., has announced the following promotions: Vincent B. Largay, former manager of the Cleveland Division, has been made assistant to the president and new products manager of the Waterbury Div. Francis A. O'Brien, former production manager of the Waterbury plant, has been promoted to manager of the Cleveland Division.

NEW DISTRIBUTOR FOR AMERICAN PLATINUM

The American Platinum Silver Division of Engelhard Industries, Inc., has named a new distributor for its complete line of silver brazing alloys in the southeastern United States. National Welding Supply, with headquarters in Charlotte, N.C., will market the materials in the southeast through its seven branches and some 200 dealers.

HANSON-WHITNEY ELECTS NEW OFFICIALS

The Hanson-Whitney Company, Hartford, Conn., announced the election of Brenniss G. Tyrrell as executive vice president and Oliver B. Ellsworth as chairman of the board of directors.

Formerly executive vice president and treasurer of The Whitney Chain Company, Tyrrell has also been with Colt's Patent Fire Arms Mfg. Co. Ellsworth, president of the Riverside Trust Company, Hartford, is also a director of the Silex Company, Chicago; Fuller Brush Company, Hartford; and Connecticut Company, New Haven.

ASSOC. FOR THE BLIND ADOPTS RIVETING

High speed riveting machines similar to those used in modern industrial plants for assembly operations currently are being installed by the Pittsburgh Branch of the Pennsylvania Association for the Blind. These machines will enable this organization to expand the number of its manufactured items and to provide its handicapped employees with experience in industrial riveting practices. This should stimulate placement programs, as well as provide the Association with a precision product that it can sell in order to support its programs.

Automatic rivet setting machines permit handicapped personnel to assemble components rapidly. Here a semi-tubular rivet drives its own hole.

The Pittsburgh Branch will use the machines to manufacture a new type of heavy-duty mop designed by Klip-on Products in High Point, N.C.

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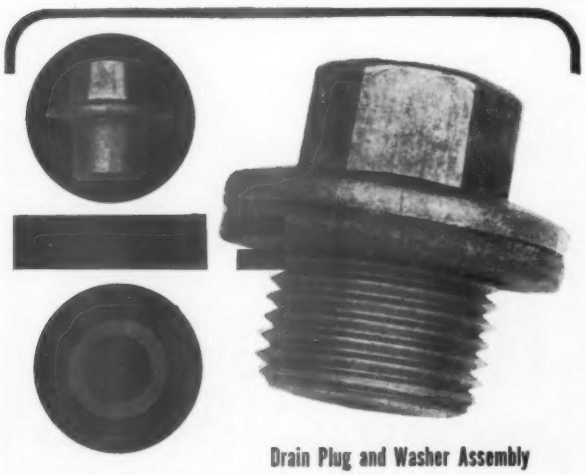

Drain Plug and Washer Assembly

DIVIDE COSTS ----

Specify assembled parts for savings in setup, tooling and floor space. Forged steel filler and drain plugs from Pittsburgh are engineered for this purpose —washer and plug now an integrated unit. Write for additional information.

Pittsburgh Plug and Products Corporation
P. O. Box 304 Evans City, Pa.

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STAR STAINLESS SOCKET HEAD CAP SCREWS

Smooth and Knurled Types, Coarse, or Fine Thread. Sizes 0.80 and Up. Splined and Flat Head, Nylock and Socket Set Screws

RIGHT OFF THE SHELF®

This is just one line of Star's stock of stainless steel fastenings listed in our 1959 Catalog. STAINLESS STEEL 300 & 400 Series

- BOLTS & NUTS • WASHERS
- PINS • AN & MS FASTENERS
- and a New STAR SERVICE— TITANIUM BOLTS & NUTS to your specs.

Send for Your Catalog today, request on letterhead please.

CORROSION RESISTANT

STAR STAINLESS SCREW CO.
713 Union Blvd., Paterson 2, N.J.
Phone: CLifford 6-2300
Direct New York phone: Wisconsin 7-6310
Direct Philadelphia phone: WAlnut 5-3660

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For pilot production, a single electrically driven rivet setting machine is being used. Equipped with an automatic feeding device that feeds the rivets to the work, it has a foot operated switch to actuate the driving mechanism. During the assembly operation, the mop and the metal clip are positioned under the spindle of the machine by the operator and aligned by use of a special jig; the rivets are set automatically when the machine is cycled by a foot switch.

WALDES NAMES MGR. ENGINEERING SVCS.

Howard Roberts has been appointed manager of engineering services for the Truarc Retaining Rings Division of Waldes Kohinoor, Inc., Long Island City, N.Y. The position is a new one with the company.

Roberts joined the Waldes engineering department in 1942. From 1949-54 he served as supervisor of production planning. He was appointed an engineering representative for the Mid-Atlantic States in 1954.

LINCOLN JOINS H. M. HARPER N.Y. SALES

Bringing to the upstate New York area many years of practical experience in the industrial fastening field, the appointment of Dana Lincoln as district manager of H. M. Harper's Syracuse branch office was recently announced by E. A. Channer, vice president of sales, the H. M. Harper Company, Morton Grove, Ill.

Lincoln was formerly with the Syracuse Supply Company.

FORMER L&S EXECUTIVE DIES

James F. Donahue, 80, former senior vice president and board member of the Lamson & Sessions Co., passed away at his Cleveland home Oct. 9. He had been retired since 1956.

Donahue was active in the metal fastener industry for more than 60 years, serving with the Oliver Iron & Steel Co., New Castle Forge and Bolt Co. and Russell, Burdsall & Ward Bolt & Nut Co. before 1920.

As president of Foster Bolt & Nut Co. when Lamson & Sessions acquired the firm in 1930, he was elected a L & S vice president and member of the board of directors.

Donahue was first vice president of the Industrial Fasteners Institute from 1947 to 1949.

ANCHOR METALS FORMS AFFILIATE CORP.

Herbert Drapkin, president of Anchor Metals Inc., New York, announced the formation of a new and separate corporation known as Anchor Alloys, Incorporated, at 968 Meeker Ave., Brooklyn. It will specialize in the precious alloys required in the manufacture of electronic semiconductors.

MAC LEAN-FOGG ADDS MIDWEST SALESMAN

Robert A. Bowler recently joined the MacLean-Fogg Lock Nut Co., Chicago, as direct sales representative for Wisconsin and northern Illinois. He resides in Lake Bluff, Ill.

A former general manager in the I.G.A. organization, he attended Dartmouth College and was graduated in 1951.

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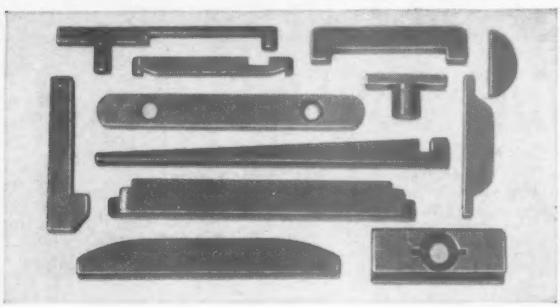

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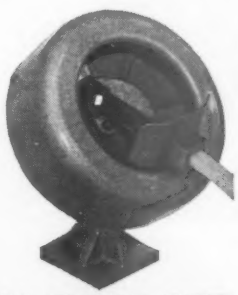

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Index to Products Advertised

Adhesives, 72
Assembly machines, 13, 76
Assembly tools, 56

Bolt making machinery, 6, 66
Bolts, 32 A-F, 45, 57, 66, 68

Clamps, 32, 37, 56, 66
Cold heading machinery, 6, 66, 67
Cold heating, custom, 4, 50

Drill stop, 32

Eyelets, 64

Fasteners
- Aircraft, 66
- Cold headed, 2nd C, 36, 49, 50, 75, 76
- Corrosion-resistant, 22, 56, 59, 63, 66, 77, 80
- Hot forged, 57
- Panel, 32, 39
- Quick-release, 10, 32, 42, 56
- Special, 2nd C, 4, 8, 22, 26, 36, 38, 39, 48, 59, 65, 76
- Standard, 4, 26, 36, 38, 45, 64, 80, 4th C

Feeders, parts, 78

Grommets, 64

Inserts, 23, 3rd C

Keys, machine, 78

Latches, 10, 42

Machine, parts washing, 20

Nuts
- Anchor, 10
- Cap, 65, 66, 80
- Clinch, 48
- Dome, 39
- Hex, 38
- Lock, 7, 21, 31, 48, 51, 58, 62, 66, 80
- Machine, 66
- Miniature, 65
- Press, 39
- Sems, 31, 80

Special, 31, 38, 39, 57, 65
- Standard, 38, 45, 59, 77
- Weld, 48, 58
- Wing, 66, 80

Parts, cold headed, 26, 32 A-F, 36, 49, 50, 76
Parts, machine, 78
Pins
- Cotter, 66
- Dowel, 45, 59, 66, 77
- Locking, 32
- Taper, 45, 59, 66, 77

Plugs, 45, 63, 77

Retaining rings, 5
Rivets, 2, 4, 10, 33, 59, 64, 78
Riveting machines, 2, 3

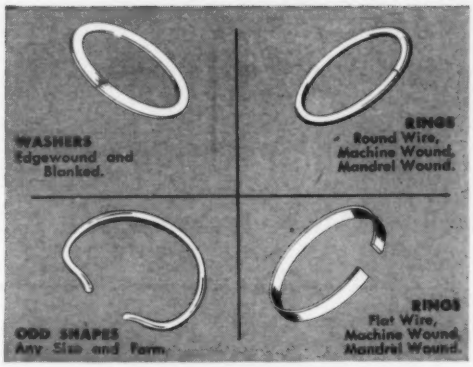
Sealant, assembly, 12
Screwdrivers, power, 76
Screws
- Cap, 27, 45, 59, 60, 66, 77, 4th C
- Dowel, 4th C
- Lock, 58
- Machine, 4, 18, 52, 4th C
- Phillips, 4, 18, 46, 52, 59, 66
- Sealing, 18
- Self-locking, 52
- Sems, 4, 18, 52, 66, 75
- Set, 27, 45, 60, 66, 74
- Special, 26, 49, 52, 57, 76
- Standard, 32 A-F, 52, 66, 77, 4th C
- Thread-cutting, 18, 24, 52, 59, 66, 75, 4th C
- Thumb, 2nd C
- Weld, 52

Services, engineering, 2nd C, 2, 3, 4, 5, 6, 8, 13, 22, 32 A-F, 33, 36, 45, 48, 49, 50, 64, 65, 67, 68, 76, 3rd C, 4th C
Solder preforms, 79
Studs, 4, 45

Tapping machinery, 6
Terminals, 64, 75
Torque tool, 56
Torque testing fixture, 66

Washer, drum jet, 20
Washers
- Flat, 64, 66, 77
- Lock, 24, 59, 66, 75
- Wrought, 22, 66

Wire, cold heading, 17
Wire straightening machinery, 74



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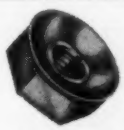

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INDEX TO ADVERTISERS

ALLMETAL SCREW PRODUCTS COMPANY, INC. 59
AMERICAN MACHINE & FOUNDRY COMPANY (Thompson-Bremer & Company Division) 75
AMERICAN SEALANTS COMPANY 12
APCO MOSSBERG COMPANY 56
ATLAS SCREW & SPECIALTY COMPANY, INC. 26

BEHR MACHINERY & EQUIPMENT CORPORATION 66
BETHLEHEM STEEL COMPANY 57
BOOTS AIRCRAFT NUT CORPORATION Third Cover
BRISTOL COMPANY, THE 60

CARR FASTENER DIVISION (United-Carr Fastener Corporation) 31
COOK & CHICK COMPANY 76

EASTERN STATES SALES COMPANY 66, 67
EATON MANUFACTURING COMPANY (Reliance-Division) 37
ELASTIC STOP NUT CORPORATION OF AMERICA 21
ELCO TOOL & SCREW CORPORATION 49

FEEDMATIC-DETROIT, INC. 78
FISCHER SPECIAL MANUFACTURING COMPANY 65

GARDNER-DENVER COMPANY 13
GILLEN COMPANY, JOHN 78
GREAT LAKES SCREW CORPORATION 52
GRIP NUT COMPANY 48
GROOV-PIN CORPORATION 23

HASSALL, INC., JOHN 76
HOLO-KROME SCREW CORPORATION, THE 27
HUBBELL, INC., HARVEY 4
HUNTER CORPORATION 67

ILLINOIS TOOL WORKS (Shakeproof Division) 24
INDUSTRIAL SYSTEMS COMPANY 20

JACOBSON NUT MANUFACTURING CORPORATION 79

KEYSTONE STEEL & WIRE COMPANY 17
KLINCHER LOCKNUT CORPORATION 51

LAMSON & SESSIONS COMPANY, THE 8
LEE COMPANY, THE 63
LUCAS-MILHAUPT ENGINEERING COMPANY 79

MACLEAN-FOGG LOCK NUT COMPANY 58
METTLER MACHINE TOOL, INC. 74
MINNESOTA MINING & MANUFACTURING COMPANY 72
MOORE INC., GEORGE W. 74

NATIONAL LOCK COMPANY 36
NATIONAL MACHINE PRODUCTS COMPANY (An SPS Company) 38
NATIONAL MACHINERY COMPANY 6
NATIONAL RIVET & MANUFACTURING COMPANY 2

PALNUT COMPANY, THE 62
PARKER-KALON DIVISION (General American Transportation Corporation) 18
PHEOLL MANUFACTURING COMPANY, INC. Second Cover
PITTSBURGH PLUG & PRODUCTS CORPORATION 77
PROGRESSIVE MANUFACTURING DIVISION (The Torrington Company) 50

REPUBLIC STEEL CORPORATION 38
ROCKFORD SCREW PRODUCTS COMPANY 50 A-F
ROSAN, INC. 39
RUSSELL, BURDSALL & WARD BOLT & NUT COMPANY 68

SCREW RESEARCH ASSOCIATION 46
SHAKEPROOF DIVISION (Illinois Tool Works) 24
SIMMONS FASTENER CORPORATION 42
SOUTHCO DIVISION (South Chester Corporation) 10
SOUTHERN SCREW COMPANY 14
STANDARD PRESSED STEEL COMPANY Fourth Cover
STANDARD SCREW COMPANY 45
STAR STAINLESS SCREW COMPANY 77
STIMPSON COMPANY, INC., EDWIN B. 64
STURTEVANT COMPANY, P. A. 66

TA MANUFACTURING COMPANY 56
THOMPSON-BREMER & COMPANY (Division of American Machine & Fdry. Company) 75
THOMSON MANUFACTURING, COMPANY, JUDSON L. 33
TINNERMAN PRODUCTS, INC. 7
TOMKINS-JOHNSON COMPANY, THE 3
TORRINGTON COMPANY, THE (Progressive Manufacturing Division) 50

UNITED-CARR FASTENER CORPORATION (Carr Fastener Division) 31

WALDES KOHINOOR, INC. 5
WEDGELOCK CORPORATION 32
WROUGHT WASHER MANUFACTURING COMPANY 22

CONTENTS in this issue

Don't overlook these articles

FEATURES

28—Standardization at Quicfrez
This refrigerator manufacturer relies on standard components.

34—Preparing Holes for Fastenings
New methods of hole coining, broaching and expansion are treated.

40—Soldering and Brazing Valves
Automatic equipment solves problems in joining parts to valves.

43—Force Gaging of Assemblies
Portable gages speed testing of assembled parts.

47—Selective Assembly for Pistons
A look at assembly-facilitating techniques at Oldsmobile.

50—Wooden Mockups Aid Computer Assembly
Pre-production use of mockups cuts lead time for equipment.

IDEAS AND REPORTS

19—Redesigned Relay Simplifies Assembly
How a clamp and a molded plastic panel increased production 30%.

20—Draw-forming Licks Swaging Problem
Boeing tapered a 2" diameter. .01"-wall tube down to ½" diameter.

22—Adhesive Sets Without Heat, Pressure
A putty-like synthetic plastic is designed for home and industry.

25—Bonding Satellite Honeycomb Paddles
Did you know that Explorer VI's "paddle wheels" contain 8000 solar cells bonded to honeycomb?

25—Soldering Typewriter Slugs
An induction heating setup improves product strength.

26—Assembling Auto Carburetors
A 12-spindle air screwdriver is described in operation.

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ONE LAST WORD

HUMAN ENGINEERING AGAIN

In this column, October, 1959, we roughed up the subject of Human Engineering. Not only was the term "Human Engineering" distasteful, but the philosophy of trying to activate human beings like puppets for no other reason than to induce them to produce more, was equally as repugnant to us.

After the issue appeared, many readers wrote us, "Whoa, there, young fellow, let us tell you . . ." And tell us they did, in the kindly manner befitting men of wisdom educating the brash boy, that Human Engineering is a respected, honored discipline, having its own 500-strong society, the Human Factors Society. A definition was advanced by Wesley Woodson in the reference book, **Human Engineering Guide for Equipment Designers,** ". . . the design of human tasks, man-machine systems and specific items of man-operated equipment for the most efficient accomplishment of the job, including displays for presenting information to the human senses, controls for human operation, and complex man-machine systems. In the design of equipment, human engineering places major emphasis upon efficiency, as measured by speed and accuracy of human performance, in the use and operation of equipment."

In other words, if we're to shoot a man into outer space, we'd jolly well better design a unit which takes the human being into consideration. That's the job of Human Engineering. Conversely, the designers of some of our automobiles had better study up on this discipline, because no man in his right mind can possibly say that our automobiles are designed for human comfort.

In view of this evidence, our October column certainly did this honorable group of designers and engineers an injustice, and we herewith apologize for the ambiguity of our October column. We were concerned with the field of industrial relations, and with some so-called efficiency experts who believe that the emotions of humans can be, and should be, scientifically engineered and directed toward more pliable compliance with the boss. Our term Human Engineering applied to this sort of poppycock. In this connection we relegate the term to mothballs. However, in its other, and true connotation, it is unfortunate that a happier name than Human Engineering has not gained a wider acceptance for this engineering-science. Human Engineering, as has been proved, is adaptable to a host of interpretations, to say nothing of the derogatory neo-witticisms which it can, and does, sponsor. This is all well understood by the readers who wrote us. Strong efforts are being made to refer to it as Human Factors Engineering, but because many published works, periodicals and reports refer to the discipline as Human Engineering, it is difficult to induce a change.

And so, hoping that matters have been righted, we take solace in the thought that every mountainous blunder is accompanied by a pinch of wisdom, and for even a small dose of the latter one should be thankful. Now let's all be friends again!

Wm. J. Schleicher

Vice President & Editorial Director

Bruce Nichols, director of purchasing — with an International Instruments' miniature Multitester in the foreground . . . with over a dozen Banc-Loks inside.

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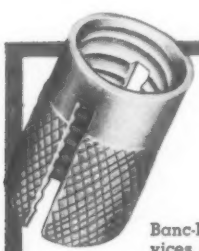

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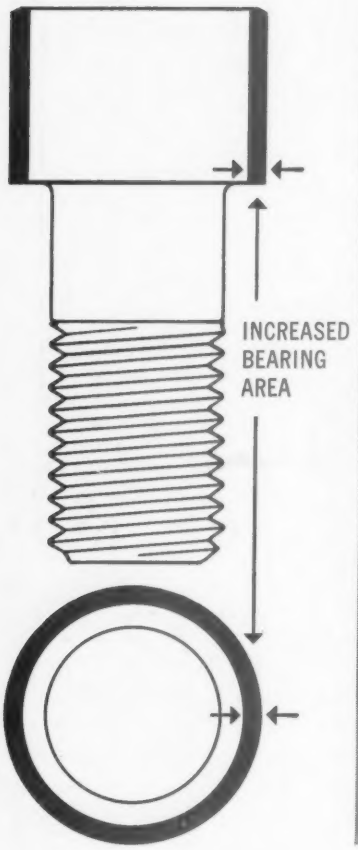
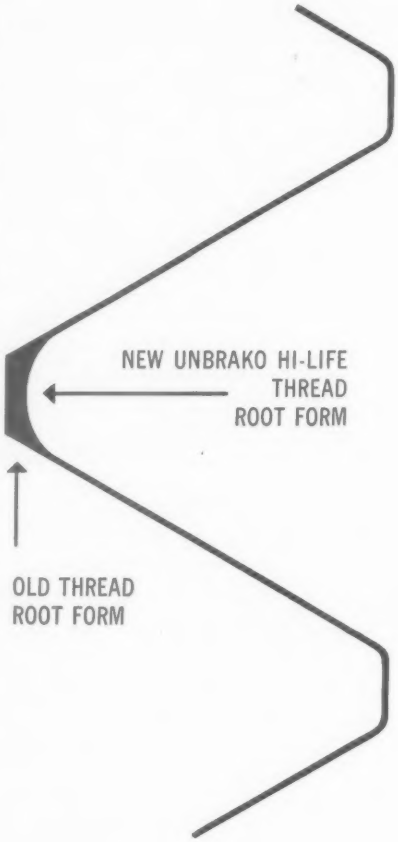


UNBRAKO pHd design features increased bearing area under the head, bigger wrenching socket; provides up to 2⅓ times as much holding power without indenting bolted material. By permitting higher preloading, pHd helps eliminate fatigue failures, reduces possibility of screws working loose under shock and vibration.

Stronger in the thread



New UNBRAKO Hi-Life thread form has smoothly radiused root, slightly more metal at minimum cross section. Result: up to 100% greater fatigue life, plus a bonus in added tensile strength. Only UNBRAKO gives you the new, larger pHd head design and the improved Hi-Life thread . . . in a standard screw at no extra cost.

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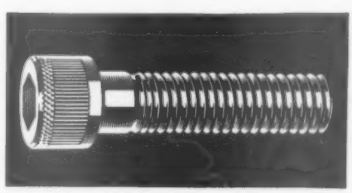
The pHd head and Hi-Life thread —both originated by SPS—are tangible results of a continuing program of basic research in the design and performance of threaded fasteners. And they reflect to no little degree SPS experience in developing special high-strength fasteners for aircraft/missile use. Nevertheless, this new UNBRAKO is available to you as a standard—at no increase in price. For complete data, write SPS—manufacturer of precision threaded fasteners and allied products in many metals, including titanium.



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